THE

GEOGRAPHICAL MAGAZINE.

JUNE, 1874.

THE RAILWAYS OF PERU.

THE construction of the Peruvian railways is, when all the circumstances are taken into consideration, one of the most remarkable engineering enterprises of our time. The land of the Yncas is divided into three distinct regions, the rainless coast deserts, with rich and fertile valleys at intervals where the rivers reach the sea; the *sierra*, including the mountain ranges of the Andes with their deep valleys, lofty plains, and towering peaks and ridges; and the *montaña*, or vast Amazonian forest-covered plains to the eastward. Each of these regions is bounteously gifted by nature. The first yields crops of sugar and cotton, abounds in vineyards and oliveyards, and is supplied by its huanu and nitrate of soda with a marvellous source of wealth. The second is the famed land of silver and copper, while its mountain slopes give pasture to sheep, alpacas, and vicuñas, and its valleys yield harvests of corn of all kinds, and edible roots. It is the home of the potato, and of the largest kind of maize. The third, while still uncleared, is the native place of the chinchona bark, of sarsaparilla, and ipecacuanha; the few clearings produce coca, and the finest coffee and cocoa in the world; while it offers millions of acres of virgin soil for future enterprise.

But these three regions of Peru are separated from each other by stupendous barriers. The maritime cordillera towers up from the coast deserts to peaks over 20,000 feet high, and the rise is so abrupt that no such view of mountain scenery can be obtained in any other part of the world. The highest mountains of the Alps could be fitted into a ravine of the Andes, while the loftier peaks of the Himalayas are dwarfed from the point of view of a spectator, because they are seen from a much higher position. Thus the region of the Peruvian coast is isolated from that of the *sierra* by a mountain barrier only to be passed through dizzy and lofty passes, and over frozen ridges. A similar barrier between the *sierra* and the *montaña* is presented by the Eastern Andes, whose peaks are the loftiest in the New World. The passes leading from the snowy summits to the tropical forests have often been described, but never more truthfully than by the old historian Garcilasso, 300 years ago. Speaking of the approach to the *coca* estates of the Paucar-Tambo Montaña, he says—"A mountain is crossed, called Canachuay, by an almost perpendicular descent, 5 leagues long, and it causes terror even to look at it; how much more to ascend and descend it, for along the whole length the road goes down in the shape of a serpent, turning first to one side and then to the other."

The ancient lords of this marvellous country, the Yncas of Ttahuantin-suyu (or the four quarters, the provinces to the north, south, east, and west of their capital of Cuzco), grappled with and overcame the dividing barriers. They saw that no victories could be complete, no system of administration permanent and efficient, unless communications were rendered easy. The road system of the Yncas was suited to the requirements of a people without horses, and whose only beasts of burden were llamas. Peru is the only country where footways have been brought to perfection; and in no country in the world are the engineering difficulties greater. Paved roads were not only carried along the whole length of the coast deserts, and of the *sierra* region between the two cordilleras, but they also connected the coast with the *sierra*, and the *sierra* with the *montaña*. Causeways were made over vast swamps, revetments were built up the sides of perpendicular ravines, and rivers were spanned by admirable rope bridges; while magazines of provisions and rest-houses were erected at regular intervals. It was through this means that the original civilization of Peru was established and rendered permanent; and so admirably perfect was the system that, as that observant statesman Ondegardo tells us, it worked almost of itself, long after the Yncas had been dethroned, and the unhappy land had been overrun by the Spaniards.

It would be unjust to deny that Spanish domination was marked by able statesmanship, and that the legislation of the Council of the Indies, except in matters connected with religion, was remarkable for beneficence and liberality in all that concerned the natives. The Spanish viceroys were generally earnest and zealous statesmen, and they were often assisted by administrators, such as Ondegardo and Solorzano, of marked ability and breadth of view. But the aims and policy of Spain were not those either of the Yncas or of modern civilization. Spain sought the spiritual welfare of the Indies, but the material well-being only of the mother country. Hence the system of communications formed by the Yncas came to ruin, and the Spaniards supplied a very poor substitute. Mule tracks were necessary to bring the silver to the places of shipment, but there were no made roads, and, except in half-a-dozen places, no bridges but those of the Yncas.

Peru of these days, now that she has at last established an enlightened government, has again to build up a system of communications from the very beginning.

The work of the Yncas, when its objects and the means available are considered, was perfectly adapted to the ends in view, and is a marvellous monument of efficiently organised labour, guided by skill and judgment, and pushed forward with energy and perseverance. But the Peruvian Republic, under the administrations of Balta and Pardo, and aided by that prince of contractors, Henry Meiggs, has very nobly emulated the example of the Yncas. Roads, as ready means of communication, are as essential to the civilization of modern as they were to that of ancient Peru. Moreover, these means of communication must be the forerunners, not the consequences, of advancement. They must awake dormant energies, tap the riches of secluded valleys and inaccessible wildernesses, and cause new wants and desires. They cannot be expected for years to give any money return on the outlay; not, indeed, until the whole system is complete, and has had full time to produce the desired results. In deciding upon a system of railways, there were two courses. The valleys on the coast might with ease have been connected with each other and with the sea; and a line might have been constructed longitudinally in the *sierra*, between the great ranges of the cordilleras, without encountering any insuperable difficulties. But this would only cause partial good. The other course presented much more formidable difficulties. It was to do what the Yncas did, to connect the coast with the *sierra*, and the *sierra* with the *montaña*, by overcoming the mighty barriers of the Andes. It was thus alone that the civilization and enterprise of modern times could restore to Peru that prosperity which she enjoyed in the days of the Yncas; and it was this course that the Peruvians determined to take. It was the resolve of a patriot nation, which will surely meet its reward. There will be a system of transverse railways bringing the valleys of the Andes into direct communication with the sea, and also a longitudinal line, from Puno to Cerro Pasco, and onwards to Caxamarca and Jaen, linking the transverse lines together. The projected railroads of the Peruvian Government, some completed, others under construction, have a combined length of 1281 miles, and will cost 128,354,600 *soles* (1 *sole* = 5 francs); and the private lines have a length of 496 miles, and will cost 24,420,000 *soles*. There are also two lines, partly private, and partly belonging to the State, with a length of 253 miles, and costing 27,200,000 *soles*. Altogether 22 lines, with a length of 2030 miles, and a total cost of 179,974,600 *soles*, or about 37,500,000*l*. Truly this is a gigantic undertaking for a nation numbering barely three millions of people; yet half the money has actually been paid, and 620 miles of rail have already been laid.

Great praise is due to Mr. Meiggs, the American contractor, who has undertaken to build seven railways for 133,000,000 *soles;* has actually completed two, while the remaining five, the longest and the most difficult, are in process of construction. But his greatest praise is due because his work is never "scamped," and is always the best of its kind. Professor Orton, of New York, who has recently returned from a visit to Peru, tells us that better laid rails, more finished bridges, culverts, and masonry work, and more admirable achievements of engineering skill are not to be found in any other part of the world. In the minutest details the work is of the best description. The gauge of all the lines is 4 feet 8½ inches, except that of Chimbote, which is 3 feet. The rolling stock is American, a locomotive delivered on the line costing from 20,000 to 25,000 *soles*, and a first-class carriage 5500 *soles*. The ties are from Oregon, the rails from England, as well as the stationary machinery, which is from Leeds. The shops and stations are generally of English galvanized iron. The engines are invariably English or American, and the labourers are Peruvian Indians (descendants of the men who made the roads of the Yncas), Chilians, and Chinese.

Commencing from the north (1) the first line connects the sea-port of Payta with the valley of Piura, where stands San Miguel, the first city founded by Pizarro. It is 63 miles long, and was contracted for in July 1872, giving facilities to several valuable cotton estates in the vale of Chira. The intention is to extend the line across the Andes, as far as Limon on the great river Marañon, passing through the provinces of Jaen and Huaca-pampa. (2) The next railway goes from the port of Pimentel to Chiclayo with a branch to Lambayeque, and is a private undertaking. The line is 45 miles long. (3) Another private line connects the sea-port of Eten and Ferreñafe, and is 50 miles long. The line passes by Monsefu, Chiclayo, and Lambayeque, and a branch connects several rich *haciendas* (farms): 48 miles are already opened. (4) The railroad from the port of Pacasmayo to Magdalena, a distance of 93 miles, is a State enterprise, and is eventually to be extended to Caxamarca: 73 miles are already completed and open for traffic. Starting from an iron mole, half a mile long, at Pacasmayo, the line passes up the valley of the river Jequetepeque, and through the village of San Pedro, the capital of a rich agricultural region, containing vast areas covered with sugar-cane, and corn; and thence over a desert to its present terminus. (5) The next line, proceeding south, is from the port of Malabrigo to Ascope, 25 miles long, and is intended to tap the rich sugar and rice estates of the vale of

Chicama. (6) The railway from the port of Salaverry to Truxillo is a State undertaking, connecting the capital of an important department with the sea at Salaverry, a distance of 85 miles. (7) The State railway from Chimbote to Huaraz is 172 miles in length, and is to extend to the mining district of Recuay. It passes up the valley of Santa, and then southward along the highlands, and is designed to open up the rich mines of the Department of Ancachs (see *Geographical Magazine* for May, p. 78): 40 miles are completed. (8) A railroad, 15 miles long, on the heights of Cerro Pasco, has been constructed by a private company, to connect the famous silver mines with the town. It was commenced in 1869, but only 8 miles are yet completed. (9) Lima is connected with the port of Chancay to the north by a line 43 miles long, (10) with its sea-port of Callao, (11) and with the bathing-place of Chorillos. The two latter lines have been at work for the last twenty years. That from Lima to Callao was opened in 1851.

(12) The grandest Peruvian undertaking is the railroad from Lima, across the maritime cordillera of the Andes to Oroya in the *sierra* valley of Xauxa. It is 136 miles long, of which 60 are finished. The work was commenced in 1870, and Mr. Meiggs has undertaken to complete it in 1876. It is thus described by Professor Orton:—"Starting from the sea, it ascends the narrow valley of the once sacred Rimac, rising the first 46 miles nearly 5000 feet. Then it threads the increasingly intricate gorges of the Andes, by a winding giddy pathway along the edge of the precipices and over bridges that seem suspended in the air. It then tunnels the Andes at an altitude of 15,645 feet, the most elevated spot in the world where a piston-rod is moved by steam, and terminates at Oroya, 12,178 feet above the sea. The difficulties encountered in its construction are without a parallel. The valley narrows to a ravine, and then to a gorge, till the closing mountains fairly overhang the infant Rimac. In fact, at one point a stone dropped will fall on the opposite side of the stream. So that in forcing the railway up the cordillera, the engineers have literally threaded the mountains by a series of sixty-three tunnels, whose aggregate length is 7000 yards. The great tunnel of Galera, by which the locomotive will finally cross the Andes, will be 1266 yards long. Besides boring the flinty rock, and constructing enormous bridges, embankments, and cuttings, the workmen [of whom 8000 have been engaged at one time] have had to contend against land-slips, falling boulders, and the disease prevalent at enormous heights, known in Peru as *soroche*. About 7000 have been killed or have died in the construction of the road thus far. Of the bridges, that of Verrugas is the most remarkable structure of the kind in the world. It spans a chasm 580 feet wide, and rests on three piers. The base of the middle pier is 50 feet square, and its height is 252 feet, of hollow wrought-iron columns made at Phœnixville, in Pennsylvania. The maximum gradient on the line is 4 per cent., the sharpest curve 395 feet radius." In course of time branches will diverge from Oroya to Tarma and Xauxa, which will be future fashionable places of resort for consumptive patients; to the silver mines of Cerro Pasco, and to Fort San Ramon in the *montaña*, at the head of Amazonian navigation on the Mayru. (See *Ocean Highways* for October 1873, p. 269.) Thus Lima and her Pacific trade will be in direct communication with the Atlantic, by rail and steamer across the widest part of the South American continent.

To the south of the Peruvian capital (13) a longitudinal line will connect Lima with the port of Pisco, traversing the rich coast valleys of Lurin, Mala, Cañete, and Chincha, a distance of 145 miles. A company has been formed for its construction by Don Manuel and Don José Ramos, and the Government contributes 2,600,000 *soles* out of the 9,200,000 that it will cost. It will open up some of the richest sugar estates on the coast. (14) The next line, to the south, is from the port of Pisco to the town of Yca, a distance of 48 miles. It is now completed, and opens up a splendid cotton and vine producing region. (15) The Arequipa railroad was commenced in 1868, and completed in 1870. Starting from the port of Mollendo, its length is 107 miles, nearly the whole of which is over a waterless desert. The old mule road to Arequipa commenced from the port of Islay, but it was found necessary to make the railway terminus at Mollendo, 34 miles further south. The line has since been continued across the Andes to Puno, on the shores of lake Titicaca; and its completion from Mollendo to Puno makes this railway the longest south of the equator. It is also the loftiest and the most serpentine line in operation anywhere, and no other road in the world can show so much heavy work. On the first division 7,000,000 cubic yards were removed. The deepest cutting is 90 feet, the highest embankment 112 feet, and 27,000 cwts. of powder have been used for blasting. On the second division the total amount of excavation was 9,858,000 cubic yards; the deepest cutting 127 feet, and the highest embankment 141 feet. There is only one short tunnel in the whole 325 miles, and only four bridges, the longest being 1690 feet. The road crosses the Andes, 116 miles east of Arequipa, at a height of 14,660 feet, where there is a cutting only 6 feet deep. The Oroya railroad excels in the engineering difficulties that have been overcome, but the Arequipa and Puno line is first in the amount of excavation, and probably in the sufferings of the labourers, from the difficulty in procuring food and fuel; the intense cold, and the rarefied air. Great altitudes, however, give one advantage, steam is generated more freely, and hence less fuel is required. In order to supply the port of Mollendo, which is surrounded by an arid desert, with water, a pipe has just been laid alongside the line for 85 miles. This is the longest iron aqueduct in the world. It starts from near Arequipa, at an elevation of 7,000 feet, and crosses the great desert between that city and the coast, discharging 433,000 gallons in 24 hours. The cost was 20,000 *soles* per mile. Puno, the inland terminus of the railway, is connected with Bolivia by steam navigation across lake Titicaca, and thus the coffee, cacao, and chinchona bark of the *montaña*, and the silver, copper, and alpaca wool of the *sierra* will find easy access to the coast. A branch line is to be made from Juliaca, a station near Puno, to the famed city of Cuzco, the ancient capital of the Yncas, a distance of 230 miles. The contract was accepted by Mr. Meiggs in December 1871, and the work has been commenced. It will be the first longitudinal line in the *sierra*, between the cordilleras of the maritime and the eastern Andes. The highest point is 14,150 feet

above the sea, over the water-parting which divides the basin of lake Titicaca from the valley of the Vilcamayu. This point, called La Raya, is about 100 miles north of the Juliaca station. Thence the line descends to 11,000 feet, following the course of the Vilcamayu, and Cuzco is 11,375 feet above the sea. There are no tunnels, and the total amount of excavation will be 5,500,000 cubic yards. The mere freight on the material for this railroad would be sufficient to build it in the United States.

Going south, along the coast, (16) the next railroad is that from the port of Ylo to Moquegua, 63 miles long, which is finished. It opens up the richest wine-producing district in Peru. (17) Next comes the line of 39 miles from Arica to Tacna, which was commenced in 1852, and opened for traffic in 1857. A company has been formed by Messrs. Hainsworth and Co., of Tacna, and Emile Erlanger and Co., of Paris, to continue this line from Tacna to the frontier of Bolivia. The company has been formed in England, with a capital of 18,000,000 *soles* (3,600,000*l.*). The length of the line will be 108 miles, and it will form a fifth transverse railroad across the Andes, connecting the coast with the *sierra;* of which one is already open for traffic. The most northern is the projected line from Payta to the banks of the Marañon. Then comes the line from Pacasmayo to Caxamarca. The third is the famous line from Lima, the capital of Peru, to Oroya. The fourth, passing by Arequipa, connects the Pacific Ocean with lake Titicaca, which is 12,000 feet above it. The fifth will be this line from Arica, by Tacna, to the Bolivian frontier.

But the list of Peruvian railroads is not even yet exhausted. The most southern coast province of Peru is the desert one of Tarapaca, separated from Chili by the wastes of Atacama. Its vast wealth consists in deposits of nitrate of soda and in borax. (18) Railroads have been commenced from the ports of Iquique, Patillos, and Pisagua to the nitrate of soda works, 93 miles of which are completed, and 69 miles are well advanced. The whole system will include 180 miles of rail. The contractors, Don Ramon Montero and his brother, propose to extend the line to Pica, and thence to Bolivia, having entered into a contract with the government of that Republic. Eventually this will form a sixth transverse line across the Andes.

Time will be required before the results of this marvellous system of communications begin to show themselves. The wealth of Peru is vast and inexhaustible; but trade is comparatively small as yet. Alpaca wool, the great export from South Peru, only leaves the coast in quantities not exceeding 10,000 quintals. The railroads will create trade. Many an enterprise —with all the elements of success save one—has been abandoned owing to the difficulties of communication; these difficulties will now disappear. Such sheep farms in the heart of the Andes as that which Mr. Mardon had at Tincopalca, will no longer be hundreds of miles from a market. The produce of the coca, coffee, cacao, and chinchona plantations of the *montaña*; of the mines and pastures of the Andes; of the sugar, vine, and cotton estates of the coast, will all be joined together, and to the ports of export, by the railroads; just as the Yncas united their provinces by their admirable system of foot roads. Isolation will cease, and enterprise will increase its efforts and multiply its undertakings a hundredfold. Emigration, the great necessity for Peru, will be promoted by this activity; and these various causes will bring remunerative returns to the railroads in course of time, and after the whole system has been connected with the lines of the Argentine Republic, and with the steamers on the Amazon.

But the Peruvian Government need not wait so long for that return which their efforts have so fully earned. There will be indirect beneficial results, fully as precious and as important as future money returns, which will follow immediately on the opening up of the interior of Peru. These will be the enlargement of mind, the creation of new ideas and new desires, which are the inevitable consequences of improved means of communication. It will never be forgotten that these results were largely promoted by the enlightened and honest administration of Don Manuel Pardo.

CLEMENTS R. MARKHAM.

THE INDIAN TERRITORY AND ITS INHABITANTS.*

THE Indian territory, where the principal civilized Indian tribes are located, is bounded on the north by the State of Kansas, on the south by Texas, on the east by Missouri and Arkansas, and on the west by Texas and the territory of New Mexico. It contains about 70,000 square miles, or a larger area than the six New England States combined. In agricultural advantages and delightful climate, it is unsurpassed by any section of the country of equal extent; the south half of it is excellent for cotton, while corn and wheat, and the best of fruits, are produced in all its settled portions. It rivals Texas as a stock country, and is much superior to Kansas in this respect. Coal, iron, lead, zinc, copper, and salt and petroleum springs abound throughout the territory; the coal is bituminous and lignite, and is of a very superior quality; none but surface measures have as yet been developed; these, at the Kansas line, are found 18 inches in thickness; they increase as you travel south, until near the southern boundary of the territory, they are 6 feet thick.

The principal tribes occupying this country are the Cherokees in the north, the Creeks and Seminoles in the middle, and the Choctaws and Chickasaws in the south: they are known as the five civilized tribes; all of them, except the Seminoles, have a written constitution and code of laws. These Indians have traditions that about 400 years ago they occupied extensive territory in the north-western part of Mexico: they probably belonged to the Aztec empire. After the fall of Montezuma, they moved in a body across the continent to the shores of the Atlantic, being fifteen years on the journey, and fighting and conquering all the hostile tribes that opposed them; they adopted the vanquished, while many of the weaker tribes sought their alliance for protection. Remnants of the Uchees, Alabamas, fire-worshipping Natchez, and other once powerful tribes may be seen to-day among the Cherokee and Creeks. None of these obliterated

* A paper read before the American Geographical Society by Colonel E. C. Boudinot.

tribes, so far as I have learned, except the Natchez, had any tradition that they formerly lived in Mexico. The traditions of these civilized tribes are fast fading away; formerly a perfect system was observed in transmitting and perpetuating them. They number in the aggregate about 50,000 souls, divided, as near as can be ascertained from present data, as follows:—Whites, who have become members of the tribes by marriage or adoption, 5,000; negroes, formerly slaves of the Indian, but now, with the single exception of the Choctaws, incorporated as citizens of the tribes, 10,000; leaving but 30,000 Indians, properly so called; of these, one-half can speak the English language. Besides the civilized Indians, the savage tribes of Arrapahoes, Kiowas, Cheyennes, Comanches, Osages, and a number of smaller tribes, numbering altogether 20,000, have been assigned reservations in this Indian territory. Nearly all of these wild Indians have a language peculiar to their individual tribes, yet they all speak the Comanche tongue, which seems to be considered by them as the correct language of the plains. The Choctaws and Chickasaws occupy a very desirable portion of the Indian territory, bordering on the Red River. They are descended from a people called the Chickamicaws, who, according to tradition, were among the first inhabitants of the Mexican empire. These tribes speak the same language, and are no doubt the same people; though as far back as any definite history can be obtained concerning them, they have maintained a separate tribal existence. The Chickasaws were an aggressive and warlike people, while the Choctaws, though defending their country with desperate valour, rarely made war for conquest. It was a singular fact, that although, a century ago, the Choctaws could not swim, the Chickasaws excelled in that art, and took especial pains to teach it to their children. The Choctaws and Chickasaws in the time of De Soto, numbered 50,000 warriors; they number at the present day 20,000 souls, all told. The Choctaws, 15,000 strong, occupy a reservation of 6,688,000 acres in the south-east corner of the territory; the Chickasaws, 5000 in number, own a reservation of 4,377,600 acres, lying west of the Choctaw nation. Though each tribe has its separate legislature and civil government, neither can make any disposition of its lands without the consent of the other; a Chickasaw has the same right in the Choctaw nation that a Choctaw has, and *vice versâ*. All the nations and tribes in the Indian territory hold their lands in common, but there is a growing sentiment among them in favour of owning land in severalty. The Chickasaws have the honour of making the first movement as a nation towards this reform in the Indian policy. In their legislature of last fall they adopted a memorial, praying the government of the United States to allot them their lands in severalty, which have already been surveyed and sectionised. The Choctaws and Chickasaws are the only Indians that have abandoned the savage titles of chief and council; their chief magistrates are governors, and their legislative bodies legislatures. There are four high schools and forty-eight neighbourhood day schools in these nations; the Choctaws sustaining thirty-six of these at a cost of $36,500, and the Chickasaws sixteen, at a cost of $33,000. The Chickasaws send a number of their youth of both sexes to some of the best schools in the States at the public expense, making the total amount expended for purposes of education more than $50,000. There is a strong sentiment among the leading men of these tribes in favour of coming into the Union as a state.

The Creek and Seminole nations lie immediately north of the Choctaw and Chickasaw reservations: they speak the same language, and are in reality the same people. A portion of the Muscogee nation seceded many years ago, and established themselves in Florida, and ever since have maintained a separate nationality. These seceders were, by the Muscogees, called Seminoles, which signifies runaways. The Creeks, or Muscogees, number 13,000, and the Seminoles 2,300. The Muscogees were called Creeks by the English, because of the numerous small streams abounding in their country in Georgia. According to a tradition of the Creeks, they came from Asia. Crossing the Pacific, they landed near the Isthmus of Darien; from thence to the north of Mexico; and afterwards to their country upon the Atlantic shores, subduing the Alabamas, Uchees, and many other warlike tribes that ventured to oppose them. Whenever the Creeks decided to go to war in olden time, their principal chief caused to be displayed in the public places a club, part of which was painted red; hence the name "Red Sticks" given to hostile Creeks in the wars with them. Within the memory of Indians now living, the Creeks, numbering, as I have said, 13,000 souls, occupied an extensive territory in Georgia and Alabama; and although at that time about 50,000 strong, they were considered a mere remnant of a once mighty nation.

There is in the Creek nation a class of Indians called Uchees; they were formerly a distinct and powerful tribe until subjugated by the Creeks and incorporated in their nation. They were doubtless the original inhabitants of an extensive country near the Atlantic coast in the vicinity of the present city of Savannah. Unlike the Alabamas, Natchez, and other tribes whose names and languages have been merged in the Muscogee and Cherokee, the Uchees still retain their name and language. They have no tradition of ever having migrated from west to east. The Creeks but a few years ago showed a marvellous respect for the decrees of their judicial tribunals. When a person was arraigned for an offence punishable with death he was given a fair and impartial trial: if found guilty, he was sentenced to be shot at a certain state of the sun five days from that time: he was then dismissed, and he returned to his home unaccompanied by any guard whatever. He passed the time as usual among his neighbours, but punctually at the fatal hour he appeared voluntarily at the place of execution to die. There was no thought of escape, no writ of error, or motion for a new trial. To evade his sentence or be behind time on the fatal day was considered infamous. It must be confessed, however, that this nice sense of honour and respect for the law among the Creeks has been impaired by their advancement in civilization.

My own nation, the Cherokee, completes the list of what is known as the principal civilized tribes. We number at present, according to the official report of the Commissioner of Indian Affairs for this year, about 15,000, but this includes about 1,500 negroes, 500 whites, and 1,500 Shawnees, Delawares, and other Indians who have become a part of the Cherokee nation. We have some forty public

free schools, and two high schools. The buildings of the latter cost $80,000 each. The Cherokees once had extensive settlements on the Appomatox River in Virginia, and formed the principal tribe in the Powhatan Confederation. The chief was a Cherokee. They are the only southern Indians who count as high as one hundred by numeral names; all other Indians count only to ten; after that they add units, as ten-one, ten-two, &c. The Cherokee calls 20 two-tens, while the Creek calls it ten-twos. Among the Cherokees, as well as among all the southern Indians, there is a class of men called conjurors, who are held in the highest estimation by the common people. They profess miraculous powers. In times of disastrous droughts the Creek conjuror still exercises his mysterious incantations to produce rain, and generally succeeds in producing it, by continuing his ceremonies until the clouds are propitious; but the honourable profession in olden times had its embarrassments and responsibilities, for, should the conjuror fail to produce rain after a fair trial, he was put to death as an impostor, and should he bring too much rain he shared the same fate. Cities of refuge, similar to those of the Jews, were recognised sixty years ago among the Cherokees. Within their sacred limits no blood could be shed. "The beloved man," or man of wisdom and peace, was absolute ruler therein. Even an enemy at war, if found within the peaceful boundaries, was entertained with the greatest hospitality and dismissed without harm.

The Cherokee language seems to be distinct and independent of all other Indian tongues; it is smooth and soft, and when spoken, by females especially, sounds most musical. There are but two words in the language which require the touching of the lips to pronounce; those two words mean *water* and *salt*, and have the sound of the English letter M. The Cherokees are the only Indians who have an original alphabet for their language. The Creeks and Choctaws use the English characters, but the Cherokees have an alphabet of their own, invented by a Cherokee who could not talk the English language. His name was Sequoyah. This inventive genius—the Cadmus of his race—had none of the lights of science or civilization to guide him; but conceiving the idea of enabling the Indian to talk on paper, as he one day saw the agent of the United States doing, he shut himself up in his cabin for more than a year, and endured like many other reformers and inventors, the gibes and jeers of the ignorant and thoughtless, who all pronounced him crazy, until he came forth with a perfect alphabet, and established his claim to be ranked among the first inventive minds of the century. He traced the characters of his alphabet on chips and pieces of bark. This alphabet was invented in 1822; it consists of seventy-eight characters, and, strange to say, is most easily learned by children. Soon after the Cherokee alphabet was perfected, type was procured, and a newspaper established, called the *Cherokee Phœnix*. My father was the first editor of that paper. One half was published in the Cherokee language, and the rest in English. After the Cherokees became settled in their present homes, the paper was continued, under the name of the *Cherokee Advocate*, and is still printed in the Cherokee and English languages, so that it may reach all classes of the people. It is now edited by my brother, Wm. P. Boudinot. In the north-east corner of the Indian territory, are situated the remnants of those once powerful and warlike tribes the Senecas and Shawnees. Most of the latter are of the Cherokee nation, but some still have a separate reservation east of the Cherokees. The Modocs have also been recently removed to this part of the Indian territory.

One great error in the legislation of this country with reference to the Indians, for the past forty years, has been that no discrimination has been made between the civilized and savage. The Cherokee or Choctaw Indian, who graduates from your best colleges, studies a profession, and takes respectable rank among your ministers, doctors, and lawyers, is still in the contemplation of your laws, just as much of a savage as the warrior of Red Cloud's band, whose Alma Mater is the bow and scalping knife. The first law of the country to regulate trade and intercourse with the Indian tribes was enacted in 1790. At that time no Indian tribe approached civilization, and the law was uniform and proper. But since then the Cherokees, Creeks, and Seminoles, Choctaws, and Chickasaws have become civilized. More than a generation has passed away since they exchanged the bow for the plough, and their superstitions and traditions for the Bible and school-book. Yet, while they have emerged from the darkness of barbarism to the light of civilization, no one could discover it from the character of your laws. It would be out of place for me on this occasion to discuss the Indian question: but in connection with the statements I have submitted concerning the civilized Indian of the Indian territory, I venture to give very briefly my own ideas of the proper policy to be pursued in relation to them. It is this: The passage by Congress of a territorial bill for the Indian country which will provide for a survey and sectionizing of the territory, the establishment of United States Courts, a delegate to Congress, and all the necessary officers of a strong civil local government for the protection of life and property, which will declare at least all the civilized Indians citizens of the United States, authorize the selection by them of 160 acres of land for every man, woman, and child; the same to be inalienable for a term of years; the lands remaining unappropriated to be sold by the United States Government to actual settlers at not less than $1.25 per acre, and the funds accruing to be invested for the benefit of the Indians, the interest of which should be used in great part, if not entirely, as an educational fund. But the plan to organise a civil government over the civilized Indian tribes, though solemnly agreed to in the latest treaties which have been made with them, is denounced by some as a job, and as being in the interest of railroad corporations. Certain railways have grants of land through this Indian territory conditioned on the extinguishment of the Indian title: and it is loudly proclaimed that the organization of a civil government by Congress will extinguish the Indian title. I have prepared a bill which is now before the appropriate committee of Congress in strict conformity to the treaty, for the establishment of a territorial government over the Indian territory, in which I have endeavoured to obviate the objection. The 17th section of this bill reads as follows: "That nothing in this act shall be construed as extinguishing or affecting in the slightest

degree the Indian title to any of the lands of any of the nations or tribes within the said territory of Oklahoma; nor shall anything in this act be construed as impairing or interfering with the rights, privileges, or jurisdiction of the tribal governments within the said territory." .The tax-gatherer is sent to the civilized Indian tribes by the authority of your Congress and your courts to levy tribute for the support of this great country, in spite of the solemn treaty which stipulated it should not be done. Is it not right and just then, that we should have some voice in your government when you compel us to contribute to its support? Then make us citizens of the United States, clothe us with the prerogatives of such, arm us with the power and rights of American citizens. Depend upon it, the civilized Indian will bless you, if he but understands that he is elevated from the degrading rank of a ward and subject to the proud position of American manhood and citizenship. You struck the shackles from the limbs of 4,000,000 slaves, and, while still dazzled by the full blaze of liberty, you girded them with the armour of American citizenship and bade them protect their new-born rights. You transformed the ignorant slave into an American citizen. Be as just and generous to the civilized Indian. His title in common is insecure. Give him a better one in severalty. He is subject to your laws and to your courts; give him a voice in making the laws which are to govern him, and the right to sit upon a jury which is to try his countrymen. He is subject to your revenue laws, and pays taxes to the support of your government; give him that representation which should go hand in hand with taxation. Give the Indian those equal rights before the law which are conceded to all other people. Arm him with the powers and privileges of an American citizen. Give him that title to his land which he can protect and defend. Then, and not till then, will he have a country which he can call his own; then will he be possessed of land which is his indefeasible property; then will he have a home where he can rest his weary feet with no dark forebodings of the future.

SIGN POSTS ON OCEAN'S HIGHWAY.

BONE-CAVES.

"The thing that hath been, it is that which shall be; and that which is done is that which shall be done."

HERE and there, beside the highways and byeways of populous earth, man erects sign-posts to guide the stranger. Time, with its relentless wing, occasionally destroys these guides, while idlers, in practical jokes, frequently obliterate them with mud or with small shot, causing poor travellers to lose their way.

Ocean, more liberal than man, has for ever erected, and will for ever erect, magnificent finger-posts beside his great highways and his little footpaths; so that those who run may read. Here also time obliterates the reading, and idlers, with their random shots, so mystify the records that the road is difficult to find.

Man restores his illegible finger-posts; ocean can no more return to do so; but if our text is true, if that which is forms a clue to that which hath been, then we have clues to restore the reading on this sign-post, so that future travellers may not miss their way.

The idlers we refer to are very different in character; he who shies mud, or fires his gun at his neighbour's finger-post, does it out of sheer mischief, because he is idle. He who takes a shot at old ocean's finger-posts, does it because he is not idle, he has reached the end of his journey, he has got other things to do; so, sooner than go back again, he takes a snap shot, thinks he has hit the mark, and, satisfied with the road he has found, leaves his record behind him, and hurries on to other journeys. Idlers though they are for not following their clues to their legitimate ends, we cannot refuse them the credit of being very industrious travellers on many roads, and while thanking them for uncounted correct interpretations of nature's sign-posts, we still call them mischievous idlers for leaving the bone-cave inscription misinterpreted.

It is a very curious thing that misinterpretations should hold their own so long; it looks as if travellers in general followed blindly the tracks before them. We take the liberty of selecting some, who, with no knowledge of parts of the subject, have not only lost their own way, but by their authority have led others astray; men who have not stopped to detect the contradictions of their guides, or seen the quagmires before them.

At the late meeting of the British Association at Bradford, Professor John Phillips, F.R.S., President of Geological Section, is reported by the *Geological Magazine* for October, to have said, "Keeping our attention on Pleistocene Geology,* we may remark that the famous cavern of Kirkdale, with the equally celebrated rock-den of bears and hyænas at Torquay, receives no small help toward clearing up the history of mammalia in Britain from the explorations now going on in the limestone cliffs not far from this place of meeting."

The next man we come to was a strong practical geologist, who not only followed the wrong trail himself, but called out to those who were on the right track to come back. Hugh Miller told his own tale too well to take it from him. In his fair work, *The Testimony of the Rocks*, p. 285, he said, "The group—that which immediately preceded the animals of our own times, and included not a few of the indigenous species which still inhabit our country—was chiefly remarkable for

* The *Geological Magazine*, No. 109, reviewing Sir Charles Lyell's last edition of the *Antiquity of Man* says, "The skeleton is all but perfect," skeleton and soil were "stained red by oxide of iron." Extinct animal remains were found with one skeleton, and at a higher level than another skeleton near Mentone, and it is "not improbable that Dr. Rivière has brought to light a complete human skeleton of Palæolithic age." These skeletons were ornamented with shells and teeth; they were therefore buried in comparatively civilized times. They were nearly perfect—they had not therefore been subjected to the water-carriage that had placed the other bones near or on the same sites. These animal bones were therefore deposited by water, while the sites were under water; the human bodies were buried when these sites were dry, when ordinary denudation had brought the cavities to the notice of man. If man lived in the "Palæolithic age," we may infer that animals also existed at the same time, that they died, and that their bones helped to make our limestone mountains. If, then, Palæolithic means anything, what does Pleistocene mean? Professor Owen, in his *Palæontology*, 2nd edition, p. 5., places the mammalian bone-beds below the oolite, and the lias next to the upper new red sandstone; at p. 445 he places carnivora at the lower end of the Eocene. The whole of the Mesozoic epoch thus coming between them. It by no means follows that because man has not found the remains, animals did not exist far into the Palæozoic age, giving their bone to the magnesian and the mountain limestones.

containing many genera, all of whose existing species are exotic. It had its great elephant, its two species of rhinoceros, its hippopotamus, its hyæna, its tiger, and its monkey; and much ingenious calculation has been employed by writers, such as Granville Penn, in attempting to show how these remains might have been transported from the intertropical regions during the flood, not only to Great Britain, but even to the northern wastes of Siberia." Now we must see where Mr. Penn had gone to that he was thus roughly called back. He had said that animals or their remains might be removed by water from one region to another; it is an undoubted fact that they have been so removed. Hugh Miller knew it very well, but he was vexed because Penn, forsaking the track that Miller was on, "gets over the difficulties of the cave, which is hollowed, I may notice, in a limestone of the oolitic series* enclosing the ammonite and belemnite, by asserting that its mammaliferous contents may *be somewhat older than itself!*" The note of admiration and the italics are Miller's. He goes on calling out to Penn, because he held that the limestone existed as a "mere pulp at the time the intertropical animals came floating northwards: they sank into it; the gases evolved during putrefaction blew up the plastic lime above them into a great oblong bubble, somewhat as a glass-blower blows up a bottle; and hence the Kirkdale cavern and its gnawed bones, and its amazing number of teeth." Hugh Miller trusted implicitly to his pioneers: he did not know that gases do blow up mud lumps on the Mississippi—the path was fashionable, and folk were gullible; but we will allow him to show how he lost his way. At p. 289, talking of antlers, he says, "the fractured specimens are generally found in caves, and show marks of the teeth of ossivorous hyænas by which they had been gnawed; thus at the same time revealing the mode in which they were introduced into these caves, and *proving the contemporaneous existence in this island of both kinds of mammalia*." On turning to p. 281, we find Miller calling a few words, quoted from Goethe, a most instructive passage—"These mountains had certainly once been covered by waves." If this was true of high hills in Germany, Miller did not see that his cave hills of Britain must also have been under water, he did not know that hyænas do not use hartshorn oil, and he had neither the beginning or the ending of his oolitic group; while neither he or Professor Phillips seem to have remembered the rule, that dust is buried chiefly in contemporaneous dust. Miller would have been astonished to find that Mr. Penn was nearer the right road than himself. We place Baron Cuvier and Professor Buckland in the front rank of those pioneers who have misled so many by their snap shots at our sign-post. The facts given by both are very similar, but we quote from Cuvier: "The general circumstances of all these caverns are extremely similar; the hills in which they are excavated resemble each other in their composition; they are all calcareous, and produce stalactite in abundance. . . . . The bones are nearly in a similar state in all these deposits, detached, scattered, and partly broken. . . . . They yet preserve their genuine animal nature, and are not much decomposed. . . . . A hardened earth, but still liable to pulverize, impregnated with animal matter, constitutes their natural envelope. . . . This is in many instances interpenetrated by, and covered with a crust of stalactite of the finest alabaster." Excepting some recent bones on the surface, "all were evidently interred in the same manner, and by the same agent." Some of the bones were a little worn on one side, but we "can only account for the vast accumulation of bones by the agency of beasts of prey." These beast were hyænas.

Miller was led into his hartshorn oil, and Phillips into his rock-dens by these pioneers. We have the reports of cave committees read at the Bradford Meeting of the British Association, giving us a few abstract facts observed at Kent's Hole, which will help us in restoring the old sign-post to its proper position. While thanking the committee for the clues given, we must say that if this committee had followed up these clues to their legitimate conclusions, they must have been much more satisfactory than we can hope to make them. We select the clues we require from these reports, from the *Times*, and place them in the order in which we propose referring to them:

No. 1. Bones, chips of bone, and teeth were found in granular stalagmite.

No. 2. Films of stalagmite invest some of the bones.

No. 3. Some of the bones are gnawed.

No. 4. Some of the bones are rubbed.

No. 5. No skeleton, or considerable part of one, was found.

No. 6. The cave earth is mixed with red clay.

No. 7. Breccia is found inside the cave.

No. 8. Bones in this breccia are comparatively few.

No. 9. These deposits are without stratification.

Each one of these abstract facts leads to separate paragraphs of nature's vast inscription. We do not pretend to read them so accurately as to restore them without some omissions, and some errors; there are minor parts of the great laws before us hard to follow, and leading into inextricable confusion if a link is missed; all that we can hope to do is so to restore the old record, that the sign-post may be legible for the future; and we may express a hope that when the clues are followed out sufficiently for this purpose, others, with a more accurate knowledge of the workings of matter, may be able so to supply our omissions, and correct our interpretations, as to leave the inscriptions indelible for the future. We offer no controversial theories, we follow the facts placed before us to their legitimate conclusions, and we venture to say that any one who has watched the workings of natural laws as we have, must of necessity arrive at the same conclusions as we do.

No. 1 shows us bones, chips of bones, and teeth scattered about in coarse granular stalagmite. What is stalagmite? We prefer that an authority should answer this question. G. F. Richardson, in his *Geology*, tells us that "water which flows through limestone rock has the power of dissolving a portion of the limestone." As the water drips it forms a stalactite. "When the supply of water, holding lime in solution, is too rapid to allow its evaporation at the bottom of the stalactite, it drops to the floor of the cave, and, drying up gradually, forms in like manner a stalactite rising from the ground, which, for the sake of distinction, is termed a stalagmite." Our committee found this stalagmite coarse, Cuvier found it fine: as

* See note, p. 95.

a rule these lime drippings follow the nature of the mass which supplies them. Hugh Miller puts these caves down to the oolitic group of the Mesozoic epoch—the formations of this group were often granular—but we shall see presently that these cave constructions can claim no particular date, though they may bear the character of a group, not from unity of time, but from unity of material. This stalagmite dries, and crusts rapidly; the teeth, chips of bones, and bones were buried in it: consequently they must have been there before they were buried. Foxes bury such portions of their dinners as they cannot eat at a sitting. Hyænas are not so provident; they are, however, sagacious brutes after their fashion; they do not carry about teeth of any sort—the tooth of an elephant would not afford skin enough for a meal. Hyænas do not dine in their dens, neither do they die there. Captain W. Havelock, two other officers of the 4th Light Dragoons, and ourselves once killed a hyæna in his den, and left him there. The usual dying place of these beasts is the water side, where the next rise of the river carries off what is left of their remains. Hyænas only eat bones when they can get nothing better. After they have eaten a bone, a small heap of gritty fragments may be found on each side of their mouth. Of all the dens and jungle layers of these beasts which we have visited, we never found a bone in or about them. We have found plenty of bones in the vicinity of tigers and cubs. The conclusion to No. 1 is that the teeth, chips of bone, and bones, were not deposited where found by hyænas or by any other wild beasts.

No. 2 follows naturally on No. 1. As the lime-water drops on the floor of the cave, it goes on percolating as long as the floor allows it. Everything resting on that floor is, therefore, liable to be invested. The droppings of this incrustation continue as long as water percolates the rock, or while there is matter for it to carry away. This fact proves that the bones were *in situ* before they were covered by the stalagmite.

Some of the bones are said to be gnawed in No. 3. If the marks on these bones are teeth marks, which we very much doubt, it is quite possible that they were gnawed before they were deposited in their present locality. We shall see by and bye that when they were deposited the whole site was under water, but when that water retired, leaving the place high and dry, nature began to denude the mass; then wild beasts may have entered this cave;* they may have taken a liking to the well-preserved, gelatinous bones, exhumed some of them, and gnawed them. As hyænas seldom gnaw bones without breaking them, we are not inclined to give them credit for the marks. If these are teeth marks, all we can say now is, that the bones were not brought into the cave for dinner.

No 4 is a very important clue, it changes the depositing agent, and rubs off many difficulties. Some of the bones are rubbed—how, and by what? They are rubbed on one side only, and by one cause. It is quite true that pigs, cattle, hyænas, and many other creatures love rubbing-posts. It has been suggested that Druids lived in these caves, and used the bones as we use huckabacks; but how were those bones rubbed that rest in the cave earth, and the stalagmite, with no signs of exhumation since they got there, and were covered by the lime films? The rubbing is on one side, the convex side, on which the bones must have rested when moved along by a water force. If they were moved along over sand or gravel, they must have been rubbed precisely as they are rubbed; if they had been forced by water over a slope of breccia, they must have been marked as if they were gnawed by teeth, with this difference, the teeth would have broken them, while the water need not have done so. The hyæna does not waste time about a bone: he fulfills the proverb, of which he may have been the originator, "he makes no bones of them." If there is anything good inside, he cracks it if he can, and eats it; but ribs, shoulder blades, and jaw bones, are left for the minor animals that generally look over the remains of his feasts. Jackalls, foxes, rats, beetles, worms, with multitudes of birds, leave very little under ordinary circumstances; but none of these waste time in rubbing bones. None of these creatures, except the fox and beetle, lay up stores for to-morrow, so that no rubbing is done by dragging a rib behind them. The bones and teeth are scattered about; no

* In *The Antiquity of Man*—second edition, 1863—Sir Charles Lyell notices many cases of bone breccia, with stalagmites entire and broken. He shows that these, and the implements of man's making found with them, must have been introduced to the caverns before the stalagmite flooring was made. He shows that bones have been found in carboniferous limestone, and in the old Devonian. He shows how liable limestone is to wear away under the influence of water percolations, and that fissures thus made, lead water and all the miscellanies that it carries into subterranean cavities made by water by slips and faults. There can be no doubt when bones are thus carried into the interior of limestone masses, that they must be covered over and preserved by stalagmite matter, when it drops upon them, exactly the same as if these bones had formed the nucleus for the lime formation to rest upon. As Sir Charles Lyell had allowed the water carriage, the breccia, and the rubbing or rolling, we were scarcely prepared for what he says in the last edition of *Principles of Geology*—that a certain condition "does not invalidate the generality of the phenomena pointed out by Dr. Buckland." Sir Charles is guarded on the subject; he admits the wild beast cautiously:—"I do not doubt that bears inhabited some of the German caves, or that the cavern in Kirkdale, Yorkshire, was once the den of hyænas. The abundance of bony dung associated with hyæna bones has been pointed out by Dr. Buckland, and with reason, as confirmatory of this opinion." As hyænas do not, in a wild state, dirty their dens, as their droppings become hard after a short exposure to the sun, as they float in water till saturated, it was as easy for them to be washed into cavities as for the heavier bones. There is, however, another view of this point. Certain bone fissures and caves have had openings for unknown periods; wild beasts or tame may have got in to eat the bones, and their droppings would have assumed an osseous character. Sir Charles Lyell seems to think that a voyage in the ocean must have destroyed bones, because there was nothing to cover them: anything placed in a sandy or muddy tideway is soon covered over. Our loosened soil gives mud in plenty now, and the bones of old gave plenty of lime. Sir Charles tells us that old geologists supposed, "that all limestones have originated in organic substances;" he thinks they are sent up by springs, but springs may reproduce organic matter in new forms.† Can we not credit the great animal kingdom with giving some bones for preservation, and some for solutions? We credit microscopical creatures with vast formations, and the beautiful results of animal labour may be seen in the wondrous marbles gathered to adorn the Italian churches, giving back to the houses of God some of that splendour given by His laws: laws which allow nothing to be lost, but preserve the most delicate tints, collected by His creations from the air and the water-shaded matter; from those creations transferred to the dust again, and, as that dust, either going through the undiscovered worlds of transmigration of matter, or building up solid pyramids by ocean's highway. In all places, and in all positions, inviting by their beauty and their consistency, fresh worshippers to the glorious laws of creation. —*H. P. M.*

animal of any sort could have done this, no one spot is even used as a cemetery by wild beasts, though they do perish in vast numbers at salt licks, and at favourite springs, but the bones do not get rubbed there, though they do retain the character of entire or broken skeletons. There is but one conclusion to this clue. Water placed the bones where we find them; water carried them, and rubbed them in the carriage. If it is asked why all are not rubbed, we reply, the bones travelled various distances, they were conveyed by varied forces, some along the bottom, some without touching it. This exemption of some from rubbing is direct and conclusive evidence of irregular conditions of water-carriage; no other cause could have produced these conditions in the bones, and the legitimate conclusion to this clue is that the rubbing was caused by water forces, as they washed the bones along on the water bed.

We come to a very interesting fact in No. 5. No skeleton, or considerable part of a skeleton, was found in Kent's Hole. Carcasses had not been deposited entire; causes had operated to break them up, to split, and to rub the bones. The questions are what were the causes, and under what natural laws did they act?

When animals are killed by beasts of prey, the flesh is very soon consumed, and the skeleton very soon falls to pieces; various animals and birds drag the remains about, so that, in the course of eight or ten days, the carcass of an ox has vanished, and his bones are scattered about. When animals die of old age, or by accident, there are generally other creatures to consume them, and a similar fate follows the skeleton. If animals fall into crevices, or mud, and die there, the skeletons are often preserved for a long time. The exclusion of atmospheric influences seems necessary to preserve any organic matter. The bones under consideration are preserved in a wonderful manner;* they are often gelatinous, and fresh, but they are scattered about and broken. As they are neither sun-dried or decomposed, they did not remain in the open air long after death. When hyænas break bones they eat them. There is, however, an agent acting under a natural law, which inevitably breaks, scatters, and deposits, in some shape or other, all bones, and skeletons entrusted to its care. As the preservation of these remains is due to matter deposited by the same agent, it seems most probable that all the conditions in which these remains are found must be due to different actions of the same law. There are two catastrophes which overtake wild animals in the midst of their careers: the quantity of bones in similar conditions in different places render it likely that one of these caused numerous deaths at different times. One is a long drought, the other is repletion by fresh-grown herbage; in the latter case, the carnivora do not necessarily die, but as their bones are found in caves mixed with herbivora, we are inclined to attribute the death of the owners of all these bones to want of water. In this case the dead bodies would lie about the beds of rivers, or any places where they had hoped to find water. As heavy rain generally falls after a long drought, all these dead bodies in the ravines and water courses must have been washed down stream. If the skin of a carcass is entire when it is floated by water, the body remains on the surface till decomposition, or other causes, admit the water; when the skin is not entire, the carcass sinks. In this case the limbs are soon dismembered and broken up; in the other case, the remains go on farther till the same fate overtakes them. In cases of drought every little stream sends its produce to the great river, so that when the rain falls, the contributions are in all conditions and in all quantities. In whatever conditions these remains were overtaken by water they must be buried eventually, the condition at the time of burial depending entirely on the character of the waters that conveyed them. Under no circumstances does a skeleton remain together, even for a few minutes, in running water;* when once broken up, the light bones do not necessarily sink to the bottom, the heavy ones do; those that sink travel slower than those which do not; so that, in a few moments, bones of the same creature may be far apart; those that are forced along the bottom are rubbed more or less according to the smoothness or roughness of that bottom, and those that are carried to a quiet burial place are buried without delay by the thick solutions of the long delayed rainfall. As the waters carry off light surface matter to-day, so they must have done in all time. As the surface-matter of to-day belongs to man's orderly world, so the surface-matter of yesterday belonged to the disorderly animal kingdom; the bones of to-day are used, those of yesterday were scattered about on the face of the earth, where accidental or natural deaths left them. We can scarcely understand now the vast quantity of bones that must have been left to decompose in those times; but as surface-matter produces mud now, so surface-matter must have produced lime then. The lime solutions of those days buried what they found to bury as mud does now; as lime solutions are used to preserve things now, so they must have preserved things of old. Cuvier mentioned the leg-bone of a snipe as having been found amongst mammalian cave bones; the *Geological Magazine* for September, 1873, mentions remains of birds, frogs, and fish as having been found amidst other bones in a cave of Kircudbrightshire. Can any one imagine any beast of prey taking the trouble to carry such dainties into his den and leaving them uneaten? If there is any limit to the range of Pleistocene mammalia, if there is any supposed boundary to the oolite formation, if any defined habitations for the beasts who once owned the bones before us, we deliberately say that all these points should be considered again,* for we can find but one conclusion to No. 5—water placed the bones as we find them, water buried and preserved them with its lime solutions. Nature provided the materials, while the never ending, still constructing, still consuming law of water force was at work upon them, breaking up skeletons into fragments, as we break up wood, and reducing bones to pulp as our paper-mills reduce rags to the same condition. Thus the nuclei and the lime solutions were prepared, and thus many caves have been formed and left by nature as we find them. We do not propose to dwell on this point; there are several causes for red earth, red marble, and red granite. We accept the explanation of Baron Cuvier that the redness of the bone-cave earth is due to animal matter.* When

* See note, p. 95.

* See note, p. 95.

animals die in great quantities, the earth around is saturated with their liquids; a heavy, sudden fall of rain not only washes off the remains, but the blood-stained mould as well. The colouring of the cave earth is the unavoidable result of the death, and speedy burial of the remains of the animals that gave their bones to fill these sites. We have now come to a very important fact. There is, says the report, much breccia, and this "must have been derived from outside the cavern, as no rock capable of supplying its materials exists in the cavern hill, while they might have been obtained from loftier adjacent eminences." Breccia is formed in two ways, either by crumbling up in its descent from high places, or by breaking up from rock masses rolling down water-courses, but not carried far enough to wear off their corners; as this breccia came from adjacent eminences, or from rocks of a similar composition, we conclude it was placed where it is found by water action. As this action is proved by the next fact, we place them together.

No. 8 tells us that the bones and teeth in the breccia were fewer than in the stalagmite—as the current was strong enough to break up rocks, by rolling them on from adjacent spots, it was strong enough to carry on bones and teeth. The bones and teeth found in the breccia were most likely brought by the same waters that brought those in the stalagmite. The latter formed heaps and banks, because there were obstructions to the current; the former did not fall in the way of the eddies and whirls formed by the obstructions, but remained in the bed of the current with the heavier breccia; as the current was stronger in its bed than on its sides, it carried on most of the light materials, leaving only such as accidentally got stopped by hitching between stones, or by being covered up by them. If it had not been for these teeth and bones, the cause of the presence of breccia might have been doubtful; as these teeth and bones are found in it here and there, there can be no doubt that all were lodged by a stream of water once running over the site. It is, however, by no means impossible that this stream may have run through the place after it was subjected to the obliteration of time,* and that the relics now found in the breccia were taken out of the stalagmite and cave earth, for stalagmite does not form where water runs. Our history does not enter here into these after doings, while they tend to confirm the erection of the cave sign-post by the side of ocean's old highway.

We now come to the last clue, on which we must dilate a little to make its history intelligible. No. 9 tell us that the deposits in Kent's Hole are without stratification—the deposits alluded to seem to be the bones and the cave earth. This is one of those beautiful illustrations of the absolute adherence of water and matter to natural laws, while the water that contains that matter seems to throw the whole into confusion.

Stratification is considered as the certain evidence of water deposit, but the absence of stratification or apparent stratification is not only a certain proof of water deposit but of the condition of the waters that left it. Every one who has read with attention the volumes of water open before him will comprehend the picture that we wish to delineate. All water that has in it matter for deposit, leaves it as stratified matter under ordinary circumstances; while under extraordinary circumstances the same matter is left unstratified The cause of this does not rest with the matter or the water, but with foreign substances that interrupt the water run. The obstacles alone cause deposits to assume their well-known chaotic confusion; yet all is done by natural laws, always at work, and no other laws could have left the materials in Kent's Hole as they are left.

Many of us have stood on boulders in tide-ways watching the waters rushing in between the rocks; many of us have walked over these boulders, when the tide has ebbed; we have seen hollows scooped out under some, sand heaped up behind others, shells, gravel, shingle behind others; no two of these tails are of similar shape, material, or quantity; the more we look the more we admire the chaotic confusion caused by the patch of boulders around us. The same results happen in the beds of rivers. During floods, boulders or other obstructions find resting-places on the confines of the stream bed, every one of these obstacles divert the current, forming whirls, eddies, and back waters, according to shape, size, and position. As the flood subsides, the solutions or the materials under the influence of the stream settle down where they can; the obstacles form harbours of refuge, a tail is formed behind each, except where crossing currents refuse a rest. When the river resumes its usual channel, leaving the obstructions and their tails high and dry, we can walk amongst them, admire the utter confusion of shape, size, and material, and see by these very signs the force and direction of the water that brought the varied materials, and left them there.

Man has looked at these drift patches; he has called the boulders erratic, as if boulders could be otherwise than erratic; he has called the clays, and other deposits with them, glacial deposits; but there is no law under which materials carried by ice could assume the condition in which we find these boulder clays, unless they had been placed at the disposal of water on being released from the ice; so that, even with ice carried materials, water is often left to place them.

We have studied these chaotic deposits forming and breaking up; we have seen them re-forming in changed conditions, not as small tails behind the little boulders of our English streams and tide ways, but as great collections of matter under the lee of vast boulders. We have seen slabs in these collections scratched and striated, the hard rock of the river bed grooved and channelled merely by the force of water moving the sand and gravel along its face. The material, eroded from river bed and from boulder, reposed in stratified condition close by the side of the chaotic masses, resting amongst the boulders, in apparently unstratified condition. There was no other power but water to produce these results. So it was in Kent's Hole; obstructions existed there when the waters flowed over the site, back waters, eddies, and whirls were caused; the bones, the teeth, the unstratified materials all sought harbours of refuge; the obstacles afforded them and the materials of varied sorts sunk down to rest in the places where we now find them, in the very condition and character observed by the committee.

The only legitimate conclusion to this clue, is that the absence of stratification is proof of deposit by

* See note, p. 97.

water currents, thrown into confusion by obstacles in those currents, which once flowed over the site of Kent's Hole. As our conclusions are spread over some space, it will be as well briefly to recapitulate them.

Beasts of prey did not bring the bones or teeth into the places where they are now found. These teeth and bones were *in situ* before they were covered by stalagmite; they were rubbed, and probably marked, by water action; they were placed where they are by water. The red clay is evidence of animal matter. The breccia, and the few bones and teeth, tell of varied water forces, and the deposits without stratification are certain proofs that water covered the whole site, while the bones and teeth were being deposited, and while the limestone rocks were forming above them as coverings and as preserves.

There is only one observation that we wish to make on the report of the Settle Cave Committee. It says—It is "clear that the hyænas and other creatures found in the Pleistocene stratum, could not have occupied the district when it was covered by ice." When was this Pleistocene period? Some have put down the supposed glacial epoch at 80,000 years ago; some one has lately proved to his own satisfaction that we were all frozen over 27,000 years ago. The difference between these periods—53,000 years—is really of no consequence to bones, when once hermetically sealed; but it seems of some importance to those who wish to fix a date for a change of climate in these latitudes, as well as for those who desire to limit certain animal productions to one group, and the formation of limestone to one system. We respectfully place all these gentlemen in the list of those idlers who take snap shots at nature's sign-posts; for want of time to follow the clues, they hold to their legitimate conclusions.

So much of fact has been mixed up with imagination in the interpretation of these bone-caves that the original monogram is nearly obliterated; we have shown, from facts connected with them, how erroneous some of these interpretations must be, and we now propose to deduce from these facts, and from our own observations of natural laws, a brief history of the erection of some of these curious and interesting sign-posts by the passing waters.

Our own experience extends only to fifty years. We have studied nature as she has opened her pages to us, and we know that that which is done, is that which hath been done, so that, with a change of material from that which in our short time has been at work, we proceed to our tale.

General System of Cave Formation.

We go back to those days when this earth was the animal kingdom; when innumerable animals lived, multiplied, and died; when rain fell upon earth, and when droughts occurred; when there were times of repletion, and times of famine; when creatures died in numbers under the influence of both as they die to-day; when the birds of the air and beasts of the field flocked together round the last water pool of a district, gathering and increasing in numbers till the last drop of water was gone; when the weak ones laid down to die, and the strong ones roamed about in hopeless wanderings; and when the beasts of prey revelled for a while on their plentiful supplies. The hyæna is a dry-living creature, the bear a very abstemious one, at seasons; but water is as necessary to them as it is to the camel or the long enduring wolf, so at last all sunk down beside the dead herbivori and their possibly gnawed bones, bestrewing the river bed and the neighbouring ravines with their emaciated carcases, with no creature to gnaw theirs. As rain falls heavily after long droughts now, so it has fallen in all times. The ravines, the river beds, were full of water; the dried-up skeletons were washed away—skin, muscle, and well-knit joints were of no avail before the water king. Rolling down the tearing stream skeletons fell to pieces, bones were broken, teeth fell out of the shattered jaws; some bones were triturated into fine, some into coarse solutions, as the waters rolled on towards their ocean goal. Here and there in the river courses, resting-places were found for some of the burdens; some wandered on to the estuaries, and were handed over to the tidal currents. There the thick solutions of animal calcareous matter, mixed with the thick solutions from the remains of ocean life; there the bone of the elephant was dashed to pieces by the side of the ammonite; and here both were buried in contemporary matter, though not necessarily side by side.* As water is the great discriminator of weights, so materials of similar characters settled down together; eddies, whirls, and back-waters build up heaps and banks of the materials entrusted to them to-day, and so they built up banks and heaps of the bones that fell to their share in old times. When currents calm down, and waters become still, their solutions find time to settle, and they cover all that is below them. On the sea beds, they formed sheets above the bone heaps, as they have formed a sheet over the mud at Ryde; as this is growing still, so the sheets grew, season by season, over the heaps and banks below, growing thicker and thicker. As artificial cement soon becomes firm and self-supporting, so these formations of nature sustained themselves; decomposition of some matter, and the sinking of other matter below, took away in time the centering on which the sheets had rested. No sooner was a space left between the roof and the matter down below, than the dripping of stalactite matter began, and, dripping down upon the still subsiding heap, interpenetrated the mass and individual bones. We have seen that this stalagmite may be fine or coarse, in some instances it has been found cracked and broken up, showing that it had infiltrated the heap of bone matter before it had done subsiding, thus adding another proof, if wanted, of speedy burial by coeval matter.

Our cave is thus formed without any infringement of natural laws; we have followed the facts, represented as now existing, to their legitimate conclusions. We have not required the gases of Penn to blow up the pasty lime into a great bubble, but we have adopted his water-carriage, not in the period of the Noachian deluge, but at any time when bones were plentiful, and floods carried them off. Our sign-posts are at various elevations; they were formed at various depths, and as old ocean left them where he made them, they became exposed at varied times. There are places on England's coast where the sea occasionally exhumes them. Ordinary denudation has introduced many caves to the notice of animals, and they have been tracked to the caves by man. He has excavated these caverns,

* See note, p. 97.

and has turned the cemetery of old bones into a dwelling place or a burial place. The relics of man, and of the animals immediately preceding him, do not necessarily belong to the same periods as the broken, rubbed, and indented bones in the cave earth and stalagmite.*

We have no date for our chalk hills, for coral mountains, for limestone rocks, or for basaltic columns; we place them in groups, systems, and epochs. We have taken the liberty, on our own authority, to suggest a reconsideration of the periods in which the bone-cave limestone rock was constructed, or in which the animals lived, whose bones are found in them. We are not solitary in our views of such geological division. Everything in nature merges by slow degrees into that which is next to it on either side. We support this by a few words of Professor Sterry Hunt, from the *Geological Magazine* of October, 1873. "The attempt to establish geological divisions or horizons upon stratigraphical or palæontological breaks must always prove fallacious. From the nature of things, these, whether due to non-deposition or to subsequent removal of deposits, must be local; and we can say confidently that there exists no break in life, or in sedimentation, which is not somewhere filled up and represented by a continuous and conformable succession. While we may define one period as characterized by the presence of a certain fauna, which in a succeeding epoch is replaced by a different one, there will always be found, in some part of their geographical distribution, a region where the two faunas commingle, and where the gradual disappearance of the old before the new may be studied. The division of our stratified rocks into systems is therefore unphilosophical, if we assign any definite or precise boundaries or limitations to these." As our nummulites, our foraminiferæ and our diatomaceæ are buried in coeval matter supplied by their own kith and kin—as the fossils of our lime formations are buried in matter given by their families, why should we deny to our mammalian bones a burial by matter partly or wholly formed from their own bodies? We will leave that question as a puzzle for anyone who likes to take it up. There have been some questions as to the indigenous and exotic bones in these caves. When once materials are entrusted to ocean currents, it is impossible to tell where they will go to; it is equally impossible to say from whence the exotic bones came that are buried in oolitic formations of ocean's deposit. We have shown that as water covered the sites of these bone caves at the time of their formation, and for long after, neither exotic or indigenous animal could have lived on the spot. As both sets of bones must have been carried to it, one set might have come from a different locality to the other. Tropical productions still find a water carriage to the arctic seas. There is therefore no difficulty in allowing that tropical bones might have been brought by ocean currents to build up our sign-posts; but, as there are regions on the earth where creatures of supposed different latitudes still live in harmony, it is by no means impossible that the owners of these old bones lived together, that they were subjected to the same repletions, the same deaths from that cause on the open plains, the same famines, and the same deaths in the river beds, with the same washing away of their remains. We throw aside the present teachings of precise æras and certain habitations: we discover in the harmony of the grave, an old harmony of life; we spread our time for elephant, rhinoceros, and cave hyæna over a greater period than the Pleistocene group, and we build our caves where there was material to build them of. We recognise in our buried strata the remains of a higher earth, where England now is, and we see these old lands connected by an animal highway, with Alpine and Pyrenean slopes. We read the inscription on old ocean's sign-post, as a guide to a great animal world, that has passed away on the wings of time, wiping out the "remembrance of former things."

We satisfy the old saying here—"Out of sight, out of mind." These old lands are fallen down, as our cliffs are falling to-day; that which is on the top goes to the bottom now, and that which was on the top went to the bottom then. No sooner did the waters retire from the level of these cave limestone hills than nature began to denude them. Rain fell on them and softened them, percolating through the inner masses; sunshine and frost cracked them, and the denudation alluded to in Nos. 7 and 8 commenced. Amongst the mountains of the Syadri range in Western India, we fell in with a very curious example of cave denudation.* The Ghara (white) River has cut its way through some 700 vertical feet of limestone rock of a coarse oolitic construction. A few miles from the town of Ghara the river becomes subterranean; a platform of limestone spans the stream at an elevation of some 2000 feet above the sea. This limestone is similar to that of the hills on either side of the valley. The channel which the river has formed for itself is a vast cave; and as the river had a clear course over its surface, it must have found some soft matter down below, through which it made an easy passage, leaving its bed open above, and returning to it still in heavy floods. There is no record of the substance that was contained in this cave; but all down the valley, on the surface soil, are still found calcareous nodules and fragments that must once have been parts of stalactite matter. If surface waters thus find out the soft places in the bosom of a great mountain range, there can be little doubt but that rainfall percolations do the same now, and have done the same in all time. As surface waters alter their course, so may subterranean waters; caves may have been left dry by these denuding streams; animals may have found entrance, and may have left on the still gelatinous bones the marks of their teeth. It may be asked here why these denuding streams should not have formed caverns, and conveyed into them the bones now found? There is no doubt that both these actions have occurred,* but the conditions of deposits and cave are not similar to the original bone-cave; the laminated rock shows fissures, materials of all ages are mixed up together, the state of preservation is not the same, stalactite and stalagmite coverings are not always provided, the inclines are often sudden, and the sides of the cavern tell of erosion. As we have said before, we are not writing on denudation, but showing how certain bone caves are made.

Man has tried to measure eternity by measuring the denudation of this earth: as its composition varies,

* See note, p. 97.

* See note, p. 97.

as the denuding forces vary, such a measurement is impossible. In these caves we find bones of creatures that lived beyond record; man's remains have been found in them. We have a record of his origin, without date; if this is forgotten we may be excused for ignorance of the other: all we do know is that creatures lived and died; we shall never know when one race became extinct, or when another began. Can we be content to know that each race had a time, and a long time? We know these facts by the sign-posts above our heads and below our feet. There is no escape from the conclusions that water placed them where we find them, and that time has partly obliterated their tombs. There is a curious phase in this obliteration that ought not to be omitted, because it is so little understood. Most of us have seen sand and gravel resting in hollows, on the tops of boulders, over which water occasionally flows; the boulders are worn away by this gravel and sand, leaving their chaotic tails behind them, without any evidence of what they belonged to. We have seen these denudations going on over large areas, and we have no doubt that the absence of causes of non-stratification has helped man to add his obliterations to those of nature.

Looking through these well-known and plentiful defacements, we have considered bone-caves as grand sign-posts to past time, as proofs that there was once a land teeming with animals, as it now teems with man; that the animals were as liable to epidemics and castastrophes as man is liable now, and as the old vegetable world was before him. We are reaping the benefit of those vegetable deposits and formations. We know that we are leaving great deposits behind us, some of which will form future caves, and we cannot help seeing that between these deposits the great animal kingdom must have given over some of its relics to the ocean. Ocean gathered from every stream that sought his bosom such contributions as they brought; with his never-failing currents, and his perpetual tides, he placed in quiet places the remains of many animals,* covering them over with winding-sheets of home-spun material—his patent pyramids—leaving them as sign-posts along his track, that those who truly sought the path to a comprehension of those immutable laws given by the Eternal Legislator, should, step by step, perceive it, and comprehend how He gave life, death, and burial; teaching us every hour of our lives that "The thing that hath been, it is that which shall be."

We have not entered into the great field of skeleton, or of ichthyolite preservation; we have kept ourselves strictly to the formations containing bone-caves; we have only touched on their denudations so far as to make our tale intelligible, and we have endeavoured to plane away the marks left by the bad shots of man. There is nothing theoretical, wonderful, or exciting in our path: we believe it to be the path of Nature. We insist on nothing but the great truth of our text; and we conclude with a question, which we hope may not be lightly answered:—Is the bone-cave a record of a wild beast's dinner, or is the bone-cave a record, left by the waters, of a world that has passed away?

H. P. MALET.

* See note, p. 97.

STATISTICS OF ROMAN CATHOLICISM IN GREAT BRITAIN.

AMONGST the facts bearing upon the population of a country, those referring to religious belief are of great importance and interest, especially if there are forms of belief, the adherents of which endeavour to influence public policy. Differences of religion have led to the most atrocious persecution and most sanguinary wars during the middle ages, and even our own times, though far more tolerant, are not free from contention traceable to religious opinion. To prove this we need only refer to the difficulties connected with the government of Ireland, to the conflict now raging in Germany, or to the minor troubles which Russia has to encounter in the reluctance of the Mennonites to submit to the law on military service.

In Great Britain no religious census has been taken for many years past, but the registration of marriages fortunately affords a ready means of arriving at the approximate number of adherents to each creed. In the case of Roman Catholics, who look upon marriage as a sacrament, the number of marriages may be depended upon as giving a result closely approaching the truth, unless, indeed, we assume that the marriage rate amongst them differs considerably from that amongst the rest of the population.

NUMBER OF CATHOLICS IN ENGLAND AND WALES.—There is not the least doubt that the number of Roman Catholics in this country has increased at a considerable rate for many years past, and it will be our business, not only to inquire into the extent of this increase, but likewise into the causes which have led to it. In the reign of Queen Elizabeth, the Roman Catholics, according to Hallam, constituted above one-third of the population, but in 1699 they had dwindled down to 27,696, being 0·54 per cent. of the total population. These were the times of penal laws; but in spite of them, when a second enumeration was made, in 1769, it was found that the Roman Catholics numbered 67,917, or 0·97 per cent. Subsequently to that year, the penal laws, though still retained on the statute book, were not enforced rigorously, and in 1778 the first Act ameliorating the position of the Catholics was passed. Yet, in spite of this, they numbered only 69,380 souls, or 0·89 per cent. of the population in 1780; and from that time down to the beginning of the present century their number remained stationary, or, perhaps, even decreased. It was only in consequence of a large influx of Irish immigrants that they began to increase. In 1844 they still constituted only 1·07 per cent. of the population, but after that time years of famine drove the Irish in ever increasing numbers from their native country. The Catholic population of England kept increasing with the stream of Irish immigrants which overflowed her shores, and in 1863 there were 5·09 Catholics to every hundred inhabitants. But the maximum had been reached, and since that year there has been a steady decrease, until, in 1871, the Catholic population found itself reduced to 4·02 per cent.

NUMBER OF CATHOLICS IN SCOTLAND.—In Scotland where the indigenous Catholic population has always been much larger than in England, especially in some districts of the Western Highlands, and on the islands, the Irish immigrants contributed to its increase in the

same manner as in England. McCulloch estimates the Roman Catholic population of Scotland in 1839 at 140,000, which would have been about 5½ per cent. of the population. In 1855, the first year for which there is a return of marriages, the Roman Catholics constituted 9·28 per cent. of the population; in 1865 they had increased to 10·16 per cent., but since that time they are steadily decreasing, numbering no more than 8·89 per cent. in 1870.

SUMMARY FOR GREAT BRITAIN.—The number of Catholics in Great Britain at different periods, and their percentage of the population, is shown in the following tabular statement:—

Year.	England and Wales.	Scotland.	Per centage of population. England and Wales.	Scotland.
1780 ...	69,380 ...	— ...	0.89 ...	—
1845 ...	328,000 ...	— ...	1.96 ...	—
1851 ...	766,000 ...	— ...	4.26 ...	—
1855 ...	909,400 ...	277,300 ...	4.83 ...	9.28
1861 ...	955,600 ...	265,500 ...	4.75 ...	8.65
1865 ...	998,000 ...	323,600 ...	4.72 ...	10.16
1871 ...	915,800 ...	277,200 ...	4.02 ...	8.23*

Catholics in Great Britain, 1871, 1,193,000, or 4.56 per cent. of population.

INCREASE OR DECREASE.—The proselytism supposed to be carried on by Roman Catholic priests, and particularly by Jesuits, has disquieted many a staunch Protestant, and the most exaggerated notions have been formed respecting it. There is no doubt that the Roman Catholic Church now and then gains over to its fold members of other congregations, and that amongst these converts there have been several whose clerical garb or social position attracted more attention than would have been the case had they been of more humble antecedents. But converts are made now and then by every church possessed of vitality, and whilst the convert to Roman Catholicism is received with a certain amount of *éclat*, those who secede from it, whether they join another church or merely content themselves with the religious principles enunciated in Strauss's *Old Faith and the New*, pass unnoticed. We have already shown that the Roman Catholic population of Great Britain is decreasing, and that at a rate which ought to alarm the friends of the only true faith. This decrease is undoubtedly taking place, and it only remains for us to ascertain whether it is due to an exodus of our Irish population, or to secessions from the Roman Catholic Church.

The Roman Catholic population of England and Wales consists of three constituent elements. There are the descendants of the old English Catholics (who are most numerous in Lancashire, Yorkshire, Staffordshire, Warwickshire, Northumberland, and Durham), the foreign Catholics and their descendants, and the Irish Catholics and their descendants. To these some would add recent converts as constituting a fourth class.

In 1780 the Catholics residing in England and Wales were found to number 69,380 souls. If these increased at the same rate as the rest of the population (203 per cent. in ninety-one years), their descendants, in 1871, would number 140,840.

Amongst the foreigners residing in England and Wales in 1871, judging by their place of birth, there were probably 42,000 Roman Catholics. If we add to this number 31 per cent. for children born in England, we obtain 55,620 as the total of foreign Roman Catholics, exclusive of course of their more remote descendants.*

The natives of Ireland residing in England and Wales in 1871 numbered 566,540. Assume that 77 per cent. of these were Roman Catholics, as is actually the case in Ireland, and we have 436,236 Catholics born in Ireland, of whom 384,000 were twenty years of age or older, and 52,200, or 11·97, less than twenty years of age. Amongst the total population the proportion of inhabitants less than twenty years of age is 45·71 per cent. Assume the same proportion to exist in the case of these Irishmen (and from the proportion of the sexes there is no reasonable ground for doubting that such is the case), and we have 583,300 Roman Catholics born in Ireland and their children born in England. Add these three items and we have—

Descendants of the old English Catholics ...	210,000
Catholics born abroad and their children	55,600
Catholics born in Ireland and their children..	583,300
Total	848,900

But as the Roman Catholic population of England and Wales amounted in 1871 to 915,800 souls, there still remains 66,900 to be accounted for.

It cannot have escaped the notice of our readers that we have included above only the children of foreigners and of natives of Ireland, and not their more remote descendants. The census returns afford some means of arriving at the numbers of these. In 1841 there lived in England and Wales 289,404 natives of Ireland; who, with their children born in England, would number about 387,000 souls, of whom 77 per cent., or about 298,000, were Catholics. If these 298,000 increased at the same rate as the rest of the population (43 per cent.) they, and their descendants, ought to have numbered 425,000 souls in 1871. But of these 425,000 souls only about 170,000 would be survivors† of the original 298,000 alive in 1841, and of these 170,000 only 97,700, would appear in the census returns for 1871 as "born in Ireland," whilst the residue of 72,300 would represent the surviving children. Deducting 170,000 from 425,000 we have 255,000 as representing the children born by natives of Ireland residing in England in 1841 after that year, and for their children's children and more remote descendants. This number more than balances the 66,900 not accounted for above, and relieves us altogether from the necessity of further pursuing this subject. Making every allowance for errors of calculation, due to the imperfect materials at our command, there is no doubt that, looking merely to the natural increase of the population, the Roman Catholics of England and Wales ought to be much more numerous than they actually are. The fact of their being stationary, or rather retrograding, can be explained only in two ways, either by an exodus of our Irish population far exceeding that of the general population, or by numerous secessions from the Roman Catholic Church.

* Estimated. In 1869 there were 9.23, in 1870, 8.89 per cent.

* In 1580 there resided in London 4960 foreigners, who had 1542 children born in England, being 31 per cent. of their own number.

† Our calculation is based on the table showing the probability of living ten years, as given in vol. iv. of the Census Returns for 1871, and in which account has been taken of emigration.

Has there been such an exodus? In 1861 there lived in England and Wales 601,634 natives of Ireland, of whom 475,290 would survive until 1871, to be returned for a second time as "born in Ireland."* The number of natives of Ireland enumerated in 1871 was 566,540. There cannot therefore have been any excess of emigration. On the contrary, assuming that none of the Irish living in England in 1861 left the country, there must have been at least 91,250 fresh arrivals to account for the natives of Ireland actually enumerated in 1871. We cannot therefore speak of an exodus of our Irish population, merely because the natives of Ireland enumerated in 1871 were less than those enumerated in 1861. Irish immigration certainly has received a check, but is still going on on a reduced scale.

There remains, therefore, only the other alternative, namely, that the secessions from the Roman Church are exceedingly numerous. And if we look to what is passing in other countries, the bulk of the population of which is Protestant; if we consider the consequences of the intolerant restrictions of mixed marriages, which require that *all* children should be brought up in the Catholic faith; to the religious indifference of our age and other causes, no surprise need be felt that such is the fact.

We have not the least hesitation, therefore, in asserting:—(1.) That the large immigration of Irish Roman Catholics into England and Wales satisfactorily accounts for the increase of Roman Catholics since the beginning of this century. (2.) That the decrease in the number of Roman Catholics observed during the last few years is due to secessions from the Catholic Church rather than to the emigration of its members.

DISTRIBUTION OF ROMAN CATHOLICS.—Our map and the table appended to this paper sufficiently illustrate the distribution of Roman Catholics and of Roman Catholic institutions throughout Great Britain. In England and Wales there are only two counties (Radnor and Merioneth) which are without a Catholic place of worship, though there are many where the number of Catholics is exceedingly small. Out of the total of 915,300, no less than 330,000 (or 36 per cent.) live in Lancashire. In Scotland a similar pre-eminence is held by Lanarkshire with its 130,000 Catholics (being 47 per cent. of all Scottish Catholics). As might be supposed from the general distribution of the Irish element, the Catholics number most largely in some of our big towns. In London there are about 131,000, or 4·02 per cent. of the population; in Manchester and Salford, 250,000; in Liverpool, about 72,000, &c.

CATHOLIC PLACES OF WORSHIP.—The increase of Roman Catholic places of worship did not keep pace, during the first year of the great influx of Irishmen, with the increase in the number of Roman Catholics. In 1844 there were in England and Wales 506 Catholic places of worship, according to the *Catholic Directory;* in 1851, 583; in 1853, 616; in 1865, 941; in 1869, 1122; and in 1874, 1025.† If we compute the number of Roman Catholics for each of these years, we find that there were to each place of worship 350, 1200, 1490, 1060, 720, and 634 respectively. In spite, therefore, of the increase in the number of places of worship, the accommodation provided for Roman Catholics is not as bountiful in 1874 as it was twenty years ago, and the increase in the number of chapels need not therefore cause anxiety to the opponents of Roman Catholicism, especially if they consider that the places of worship provided for the use of Protestant bodies are comparatively more numerous.

The above statement respecting the places of worship has been taken from the summary given annually in the *Catholic Directory*. We have taken the trouble of casting up the chapels, &c., mentioned in the Directory, and our results do not differ materially from the above. We have included under "Churches and Chapels," only those places of worship to which a priest is permanently appointed: under "Stations," all those chapels, rooms, &c., which are visited by a priest only occasionally. Many of these are nevertheless registered for the celebration of marriage. Chapels supported at the public expense, as are those in barracks, prisons, workhouses, &c., as well as convents have been excluded. We arrive thus at the following results for the years 1865, 1869, and 1874:—

	1865.		1869.		1874.	
	Churches.	Stations.	Churches.	Stations.	Churches.	Stations.
England and Wales	717	133	822	130	843	187
Scotland	122	55	120	72	135	87
Isle of Man	6	...	6	...	8	...
Channel Islands	2	2	2	2	2	2
Total ...	846	190	950	204	988	276

The details for the year 1874 will be found in the tabular statement at the end of this paper.

PRIESTS.—The increase in the number of priests kept pace pretty well with the increase in the number of places of worship. The latter, between 1865 and 1874, increased to the extent of 22 per cent., the priests to the extent of 24 per cent. In the former year there were in Great Britain 1521 priests; in 1874, 1893. The increase amongst the regular priests (or monks) has, however, been greater than that amongst the regular clergy. The details for the two years named are given in the following tabular statement.—

		Bishops.	Secular Priests.	Regular Priests.	Total.
1865	England and Wales	17	902	410	1329
	Scotland	4	58	21	183
	Isle of Man	...	3	...	3
	Channel Islands	...	6	...	6
	Total	21	969	431	1521
1874	England and Wales	17	1000	634	1651
	Scotland	3	187	41	231
	Isle of Man	...	3	...	3
	Channel Islands	...	8	...	8
	Total	20	1198	675	1893

These figures show that there is now in England and Wales one Roman Catholic priest to every 580 Roman Catholics, which is a high proportion if we consider that there was only one clergyman, minister, priest, or missionary to every 673 inhabitants enumerated in 1871, but exceedingly moderate in comparison with some intensely Roman Catholic countries, such as Italy, where (in 1861) there was one priest to every

* The mean age of the population of England and Wales is 26·4 years. We have assumed the mean age of the natives of Ireland to be 36 years, an assumption justified by a careful consideration of the census returns.

† This decrease is merely apparent, and results from a different system pursued in counting places of worship.

7° 6° 5° 4° 3° 2°

Kirkwall
Lerwick
Thurso
Wick
Stornoway
Harris
NORTHERN DISTRICT
Invergordon
Banff
Elgin
Fochabers
Keith
Dunbeath
Portree
Dunbar
Huntley
Glenlivat
Ward Ho.
Tarbert
Canna
Ballogie
Barra
Braemar
Eigg
Montrose
Tobermory
Dunkeld
Arbroath
Blairgowrie
Oban
Crieff
Perth
Alloa
Dunfermline
Kirkcaldy
Leith
Dunbar
Haddington
Edinburgh
Kelso
Duns
Galashields
Selkirk
Jedburgh
Hawick
Campbelltown
Ayr
Girvan
Bellingham
Dumfries
Dalbeattie
Newton Stewart
Cn Douglas
Kircudbright
Stranraer
Carlisle
Wigton
Maryport
Workington
Whitehaven
Shap
Dodding
Rameay
Peel
Douglas
Castletown
Kendal
Millom
Barrow in Furness
Bolton
Fleetwood
Blackpool
Southport
Liverpool
Birkenhead
Holyhead
Llandudno
Rhyl
St Asaph
Flint
Chester
Bangor
Caernarvon
Denbigh
Ruthin
Wrexham
Manwich
SHREWSBURY
Welshpool
Shrewsbury
Bridgenorth
Abergavenny
Brecon
Caermarthen
Haverfordwest
Pembroke
Tenby
Llandilo
Aberdare
Merthyr
Tredegar
Ebbw
Llanarthy
Monmouth
Usk
Pontypool
Aberavon
Treforest
Bridgend
Cardiff
Sodbury
Wotton
Chilton
Bristol
Bath
Midford
Weston
Ilfracombe
Barnstaple
Cannington
Bridgewater
Taunton
Bonhams
Frome
Tiverton
Exeter
Axminster
Chudleigh
Dorchester
Lyme Regis
Bridport
Lanherne
Bodmin
Liskeard
Torquay
Teignmouth
Dartmouth
Plymouth
Camborne
Penzance
Helston
Falmouth
St Austell
NEWPORT & MENEVIA
DISTRICT
EASTERN DISTRICT
WESTERN DISTRICT
SOUTH DISTRICT
DEVONSHIRE & CORNWALL
BRISTOL & SOMERSET
BIRMINGHAM & NEWCASTLE
BRISTOL & SOMERSET

53° 52° 51° 50°

6° 5° 4° 3°

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Map of Great Britain
shewing the Distribution of
ROMAN CATHOLICS,
— and of —
R. Cath. Chapels, Convents & Monasteries.

By E. G. Ravenstein, F. S. S.

- ● *Roman Catholic Church or Chapel.*
- ○ *Roman Catholic Chapel or Station attended only occasionally.*
- ♁ *Monastery.* ♁ *Convent.*
- *Town having one or more R. Cath. Chapels, Monasteries and Convents.*

Boundaries of the Roman Catholic Dioceses of Great Britain.
County Boundaries.

The tint expresses the proportion of Roman Catholics to the general population in 1871 (England & Wales) or 1870 (Scotland), viz:
The Roman Catholics constitute 10 or more per cent of the total population.
do... from 5 to 10 per cent.
In the districts not tinted they number less than 5%.

LONDON AND ENVIRONS.

Fraserburgh
Peterhead
Aberdeen
Blairs College
Berwick-on-Tweed
Lowick
Ellingham
Wooler
Alnwick
Callaly
Felton
Morpeth
Blyth
Tynemouth
South Shields
Newcastle
Sunderland
Stockton
Hartlepool
Darlington
Richmond
Whitby
Scarborough
Thirsk
Ripon
Malton
Bridlington Quay
York
Beverley
Hull
Barnsley
Doncaster
Sheffield
Rotherham
Worksop
Lincoln
Boston
Grimsby
Louth
Nottingham
Derby
Grantham
Ashbourne
Leicester
Hinckley
Coventry
Rugby
Warwick
Northampton
Bedford
Stratford
Banbury
Oxford
Cirencester
Gloucester
Cheltenham
Worcester
Malmesbury
Swindon
Reading
Newbury
Basingstoke
Winchester
Salisbury
Southampton
Portsmouth
Chichester
Brighton
Eastbourne
Hastings
Boulogne
Dieppe
Wisbeach
Lynn
Spalding
Peterborough
Stamford
Thetford
Ely
Newmarket
Cambridge
Bury St Edmunds
Ipswich
Woodbridge
Colchester
Harwich
Landguard
Maidstone
Canterbury
Margate
Ramsgate
Deal
Dover
Ashford
Tenterden
Rye
Hythe
Folkestone
Sandwich
Shoreham
Arundel
Worthing
Lewes
Guildford
Dorking
Aldershot
Farnham
Godalming
Horsham
Crawley
Reigate
Redhill
Tunbridge
Sevenoaks
Maidstone
Chatham
Rochester
Gravesend
Dartford
Crayford
Erith
Woolwich
Greenwich
Deptford
Lambeth
Kingston
Richmond
Brentford
Hounslow
Isleworth
Windsor
Slough
Eton
Maidenhead
Henley
Wycombe
Aylesbury
Buckingham
Towcester
Daventry
Northampton
Kettering
Wellingborough
Thrapston
Oundle
Peterborough
Wisbeach
Boston
Spalding
Lincoln
Gainsborough
Retford
Worksop
Doncaster
Barnsley
Wakefield
Leeds
Bradford
Halifax
Huddersfield
Dewsbury
Selby
Goole
Howden
Beverley
Driffield
Malton
Thirsk
Northallerton
Richmond
Darlington
Durham
Stockton
Hartlepool
Sunderland
Newcastle
Gateshead
Tynemouth
Blyth
Morpeth
Alnwick
Berwick-on-Tweed
Lowick
Ellingham
Wooler
Callaly
Felton
Throphton
Rothbury
Hexham
Corbridge
Haltwhistle
Brampton
Carlisle
Penrith
Appleby
Kendal
Lancaster
Preston
Blackburn
Burnley
Todmorden
Halifax
Bradford
Keighley
Skipton
Settle
Ingleton
Clitheroe
Whalley
Accrington
Bolton
Wigan
Warrington
Chester
Wrexham
Ruthin
Denbigh
Rhyl
Bangor
Carnarvon
Holyhead
Llandudno
Conway
Abergele
St Asaph
Flint
Mold
Holywell
Chirk
Oswestry
Shrewsbury
Wellington
Newport
Market Drayton
Nantwich
Crewe
Sandbach
Congleton
Macclesfield
Stockport
Manchester
Salford
Bolton
Bury
Rochdale
Oldham
Ashton
Stalybridge
Hyde
Glossop
Buxton
Matlock
Chesterfield
Mansfield
Newark
Grantham
Stamford
Peterborough
Wisbeach
Lynn
Swaffham
Thetford
Bury St Edmunds
Newmarket
Cambridge
Ely
Ramsey
St Ives
Huntingdon
Kettering
Thrapston
Oundle
Daventry
Towcester
Buckingham
Aylesbury
Wycombe
Henley
Maidenhead
Windsor
Eton
Staines
Chertsey
Guildford
Godalming
Farnham
Alton
Petersfield
Midhurst
Arundel
Worthing
Lewes
Hastings
Rye
Tenterden
Ashford
Maidstone
Rochester
Chatham
Gravesend
Dartford
Crayford
Erith
Woolwich
Greenwich
Deptford
Lambeth
Kingston
Richmond
Brentford
Hounslow
Isleworth
Windsor
Slough
Eton
Maidenhead
Henley
Wycombe
Aylesbury
Buckingham
Towcester
Daventry
Northampton
Kettering

194 inhabitants. It should be observed, however, that this favourable proportion between the priests and their flocks has existed only within the last few years, and is due in no small measure to the cessation in the increase of the number of Catholics; and that in 1853, for instance, there was only one priest to every 1071 Catholics.

MONASTERIES AND CONVENTS.—If there is any subject connected with Roman Catholicism which arouses the ire of No-Popery men, it is the ever-increasing number of religious houses; and it affords but small comfort to them if they learn that most of the monks (or regular priests) are engaged in the conduct of public worship, whilst the sisters find employment in schools or charitable institutions. The number of religious houses has increased steadily ever since 1829, when there existed only 6 convents, and in 1841 there were 17 religious houses; in 1865, 245; in 1874, 329, in addition to 27 in Scotland. The details for the years 1865 and 1874 (as given in the *Catholic Directory*) are as follows:—

	England and Wales.			Scotland.		
	1865.	1869.	1874.	1865.	1869.	1874.
Monasteries	58	68	85	5	6	6
Monks (regular priests)	373	432	634	20	33	41
Convents	187	214	244	14	18	21

It appears that there is now in England and Wales one monk to every 1490 Roman Catholics.

With reference to the number of nuns we possess no data furnished by Catholic authorities, but we learn from the census returns that there were in 1871, 2474 "nuns, sisters of charity, of mercy, &c.," 152 of whom were under 20 years of age. This number, however, probably includes Protestant sisterhoods, and it is to be regretted that no distinction was made between the two classes.*

The distribution of the monasteries and convents throughout Great Britain may be gathered from the tabular statement appended to this paper. The 675 regular priests of Great Britain belong to 27 different religious orders. The Jesuits have 12 monasteries, the Fathers of Charity and the Benedictines 8 each, the oblates of St. Mary immaculate and Capuchins 7 each, and the Dominicans 5. The nuns belong to no less than 63 religious orders, the names of many of which are indicative of their foreign origin. There are 41 convents of Sisters of Mercy, 34 of Sisters of Charity of St. Paul, 17 of School-sisters of Notre Dame, 14 of Sisters of Charity of St. Vincent of Paul, 12 of Faithful Companions of Jesus, 11 of Little Sisters of the Poor, 8 each of sisters of the order of the Good Shepherd and the Congregation of Mary, 7 each of Benedictines, Sisters of the Holy Family, and Sisters of the Holy Child Jesus, &c.

* It is, indeed, very desirable that more care should be bestowed upon the *moral* training and education of our Catholic population; and now that the Roman Catholics have a sufficient supply of chapels, it is to be hoped they may do something towards the establishment of schools, conducted by properly qualified schoolmasters and mistresses, and not by monks and nuns. Amongst the prison population of England and Wales, no less than 18 per cent. are Catholics, the Catholic population numbering hardly more than 4 per cent. of the general population. In other words, the chances of a Catholic committing a crime are more than four times greater than in the case of a Protestant. This, certainly, is a glaring instance of the influence of education upon crime; but if the Rev. M. H. Seymour, in his "Evenings with Romanists," traces illegitimate births and murders to the doctrines promulgated from Rome, he certainly shoots beyond the mark. The statistics of illegitimate births show very clearly that their number is altogether independent of religious belief, and is influenced mainly by bad laws and social circumstances. Remarkable instances of this are Mecklenburg and Bavaria, where the rate of illegitimate births fell immediately certain Malthusian restrictions to marriage were removed. Or does the rev. gentleman referred to mean to maintain that London is more moral than the country, because its illegitimate births are fewer? Might we not almost be justified in coming to an opposite conclusion?

TABULAR STATEMENT showing the proportion of Roman Catholics in the counties of England and Wales (1871), and Scotland (1870), and the number of Roman Catholic Chapels, Stations, Monasteries, and Convents according to the Roman Catholic Directory for 1874.

The Counties are arranged according to the prevalence of Roman Catholics.

Roman Catholic Chapels supported from public funds (in Barracks, Workhouses, &c.) have been omitted.

COUNTIES.	Roman Catholics in per cent. of Population.	Churches.	Stations.	Monasteries.	Convents.
Lancashire	11.6	185	16	16	45
Durham	8.5	41	6	...	8
Cumberland	7.3	10	1	...	2
Northumberland	5.9	29	3	1	4
Cheshire	5.6	30	5	2	4
Monmouth	4.4	13	9	2	...
Glamorgan	4.4	9	8	3	4
Warwick	3.9	33	3	2	14
York, West Riding	3.8	48	17	3	14
Brecknock	3.5	1	1	...	...
Middlesex	3.5	65	9	24	45
Staffordshire	3.4	41	5	1	9
York, East Riding	3.1	12	2	2	4
Derbyshire	2.6	11	5	...	3
Surrrey	2.6	23	1	5	12
York, North Riding	2.1	20	10	1	2
Flint	2.1	7	...	2	2
Kent	1.9	21	12	4	3
Westmoreland	1.9	2	1	...	1
Denbigh	1.7	2	2	...	...
Leicester	1.4	13	7	5	1
Gloucester	1.4	16	5	1	10
Hampshire	1.3	18	3	1	2
Hereford	1.3	7	...	1	2
Essex	1.2	4	5	...	1
Nottingham	1.1	5	2	...	2
Oxford	1.1	9	...	...	2
Worcester	0.9	15	1	1	4
Devon	0.8	12	2	...	7
Lincoln	0.8	13	2	...	...
Pembroke	0.8	2	1	...	...
Sussex	0.7	17	6	3	9
Shropshire	0.7	10	5	...	1
Dorset	0.6	9	...	...	3
Wilts	0.6	7	1	...	3
Berks	0.5	9	3	1	2
Norfolk	0.5	7	1	...	2
Cambridge	0.4	4	4	...	...
Suffolk	0.4	7	5	1	2
Carnarvon	0.4	3	...	...	...
Anglesey	0.4	1	...	...	...
Herts	0.3	20	5	2	8
Somerset	0.3	12	3	1	3
Bucks	0.2	5	1	...	2
Cornwall	0.2	5	4	...	1
Northampton	0.1	3	3	..	.
Carmarthen	0.1	2	...	...	...
Bedford	...	2	1	...	...
Huntingdon	...	1	1	...	...
Rutland	...	1	...	...	...
Cardigan	...	1	...	...	...
Montgomery	...	1	...	...	...
England & Wales	**4.02**	**843**	**187**	**85**	**244**

TABULAR STATEMENT.—*Continued.*

COUNTIES.	Roman Catholics in per cent. of Population.	Churches.	Stations.	Monasteries.	Convents.
Renfrew	17.2	10	1	...	...
Lanark	16.5	25	9	4	7
Dumbarton	15.6	4	1	...	...
Linlithgow	12.6	4	3	...	...
Inverness	12.0	17	11	...	1
Forfar	8.5	5	3	...	2
Haddington	7.7	1	2	...	...
Stirling	6.9	6	4	...	...
Edinburgh	6.1	5	2	1	4
Nairn	5.1	1	...	...	...
Roxburgh	4.7	2	3	...	...
Ayr	4.5	10	5	...	...
Bute	4.4	1	...	...	...
Dumfries	2.8	1	2	...	...
Elgin	2.5	2	...	...	1
Banff	2.5	10	1	...	1
Argyle	2.5	5	6	...	...
Peebles	2.5	1	1	...	...
Wigton	2.1	2	3	...	...
Selkirk	2.1	1	2	...	...
Perth	2.0	4	7	1	1
Aberdeen	1.9	9	5	...	3
Kircudbright	1.8	3	4	...	...
Fife	0.9	3	5	...	...
Clackmannan	0.7	1	...	...	...
Berwick	0.5	...	2	...	...
Ross and Cromarty	0.3	1	1	...	1
Kincardine	...	...	1	...	...
Caithness	...	1	1	...	...
Orkney and Shetland	...	...	2	...	...
Scotland	**8.89**	**135**	**87**	**6**	**21**
Great Britain	**4.56**	**978**	**274**	**91**	**265**
Isle of Man	...	2	2	...	1
Channel Islands	...	8	...	1	2

E. G. RAVENSTEIN, F.S.S.

SINGAPORE.*

WHO, on visiting the capital of that important dependency of the British Crown, "The Straits Settlements," Singapore (the position of which in regard to the entrance of the China Sea caused it to be regarded as the key, if not now so considered), would not ponder and note within himself the caution and consideration that must have been exercised, and the prudence and wisdom that dictated the selection of such a spot for a settlement, commanding, as it does, the very elbow of the Strait of Malacca, and obliging every vessel entering or leaving the China Sea by that route, to pass within sinking distance of the forts of the harbour? After all this consideration and mental approval of the evident cause of the position being selected, would not the visitor be surprised to learn that the selection of Singapore as a British station was one far more the result of accident than of selection, and that the expedition that founded the settlement had actually sailed for another destination? Still such is the fact, although not generally known, and Singapore with exports and imports now valued at from fifteen millions to twenty millions, and a population exceeding 100,000, was a little over half-a-century ago a place comparatively unknown.

* The substance of the following account of our taking possession of Singapore Island was kindly furnished to the writer by Archibald Ritchie, Esq., who was present on the occasion.

But let us take a bird's-eye view of Singapore as it is, and for which purpose let us toil to the summit of Serapong, from which elevation we shall obtain all we can desire. Serapong is termed *par excellence* "Mount," although rising but 300 feet above the sea. It is but a mole hill to talk of toiling up it!—but stop—on or near the equator—

"Where the sun no lengthened shadow throws,"

a temperature of 96° in the shade and not a breath of wind, we may well be pardoned our expression of "toiling up it,"—and oh the luxury of reaching the top! saturated with perspiration and feeling the cool breeze which, from being on the leeward side, we had not before felt. What a glorious sight bursts on us! We are on the highest point of Blakan Mati Island, the western end of which, together with Ayerbrani Island, lying immediately beneath us, forms the New Harbour, the north shore of which is now lined with docks, wharves, and storehouses, and all the busy work going on of a thriving and prosperous sea-port. Alongside the wharf of Tibing Tingi, lies one of the floating palaces of the Peninsular and Oriental Steam Company, taking in the nourishment of fuel, of which they consume so much; and, forming a background, the hills rise and shut out further view of the country in that direction.

Round that long sandspit, lengthened out, as it were, by numerous lines of fishing stakes, lies the town of Singapore, with the many-winding river dividing it. How clear and distinct it is, notwithstanding the haze that hovers over it, caused by the extreme heat, and we see at once the advantage of those villa-topped hills, rising as they do above the hazy line. We do not wonder at those eligible localities being seized on for the erection of cool bungalows to retire to after the heat of such a day as this: in the town every foot above the sea level has its value. We can clearly see the church and its neighbouring esplanade, dear to the European for the cool drive round in the evening, and, just beyond, the Institution, which is named after that truly great man, of whom we shall have to mention, Sir Stamford Raffles; and again, beyond this, the native town, which covers a large extent of ground. All seems quiet and lovely at Singapore, too far distant for the disagreeables to intrude, and yet not too far for a minute survey; it may be described as just that, where "distance lends enchantment to the view." And then to turn from the works of man, and let the eye wander over the range of country visible from our vantage-point, how truly lovely it appears; the deep jungle, stretching ridge beyond ridge, until it meets the high mountains rising behind it in the distance. But how treacherous is that beautiful country—death lurks in the miasma rising from the jungle, and the too frequent visits of the *man-eater* do not tempt one to explore far within its depths.

We must not forget the *Roads*, in which lies many a gallant merchant ship, from all maritime nations under the sun. How varied are their rig! Some are taking in cargo, and we can almost fancy, as we look through our telescope, that we can hear the shrill whistle of the Serang, and the clapping of the hands of one-half of his gang as they hoist in the bags of rice or spice; while stealing over the calm water is the prah of the Malay, the Chinaman in his sampan, and the English captain of the man-of-war in his six-oared gig: such is Singapore of the present.

At Fort Gloster, a manufacturing and ship-building establishment on the Hoogly, about 23 miles below Calcutta, resided, in the year 1818, a gentleman, still alive, and then in charge of the station: this gentleman, Mr. Ritchie, received intelligence that one of the ships (the 'Rodney') belonging to the firm he represented, was *on shore* about 36 miles down the river, and that she had on board, as passengers, Sir Stamford Raffles and family. He immediately despatched a boat to their relief, and after extending the rites of hospitality to the party, who had been somewhat alarmed at the position they had been placed in, forwarded them the next day to their destination, Calcutta.

Sir Stamford Raffles had just resigned his charge, as temporary Governor of the island of Java, to the Dutch, in accordance with the intention of the British Government, who had only assumed the possession to prevent that important island falling into the hands of the French, and was then on his way to visit the Governor-General of India, General Earl Moira (afterwards Marquis of Hastings).

The object of Sir Stamford's visit to Calcutta was to take counsel with the Governor-General in regard to obtaining possession of some station in the Malacca Strait, for the protection of our great trade to the East Indies, and Sir Stamford's intimate knowledge of the tangled dynastic position of the numerous petty Malayan rajahs and of their language—and for which knowledge he had been selected, when Mr. Secretary Raffles of Penang, by Lord Minto, to accompany him, when about to take Java under British protection, and then leave him Governor of the island—rendered him peculiarly competent to undertake the establishment of a colony, for the purpose stated.

Having completed the object of his visit, and armed with the necessary powers from the Governor-General, Sir Stamford proceeded to Penang, there to collect troops and organize his expedition.

At this time Mr. Ritchie was sent as supercargo in a fine ship the 'Marchioness of Wellesley,' of 900 tons, to Penang, and arrived there when preparations for the expedition were being made, and as the 'Marchioness of Wellesley' was adapted for the conveyance of troops, Mr. Ritchie was induced by Sir Stamford to discharge his cargo for the purpose of accompanying the expedition.

About a week after the expedition sailed; its destination being the Nicobar Islands, which, lying immediately across the western entrance of Malacca Strait, was considered a good position for commanding the strait; but the nature of those islands was then imperfectly known, for although a survey had been some time in progress under Captains Ross and Crawford, of the Indian Navy, the result of that survey had not been published or made known; but those officers having heard of the object and destination of Sir Stamford's expedition, and not having time to reach Penang before it sailed, waylaid it, and in time to alter its destination.

The surveyors had an interview with Sir Stamford and Colonel Farquhar, who commanded the troops, and producing their charts, pointed out the deficiencies of the Nicobar Islands in harbours, or places of shelter, for shipping, and the superior advantages of Singapore Island, which they had lately surveyed, and that, in addition to the superiority of geographical position, the island was rich and fertile, and the roads and harbour commodious and well adapted for all purposes connected with shipping.

Another accidental advantage lay in the absence of any native government, the Rajah having, only a few months previously, been obliged to fly his dominions from his dynastic enemies, and most of his subjects had followed him, so that at the time there were not more than 150 Malay inhabitants on the island.

The soundness of the views thus laid before Sir Stamford were unanswerable, and a council of war being summoned, the subject was discussed, and the result was an order to alter the course of the expedition for Singapore, where they arrived on the 23rd February, 1819.

It is needless to say that Sir Stamford Raffles found Captains Ross and Crawford's report correct in every particular, and the British flag was hoisted where the extensive town of Singapore now stands.

BRITISH COLONIAL WOOL TRADE.

NEARLY 800,000 bales of British Colonial wool, of the value of 15,000,000*l.*, are annually sold in London, but so accustomed are Englishmen to large mercantile transactions that but very few, on reading these figures, would probably stop to inquire how this trade has come to assume such immense proportions, and from whence all the wool comes.

Our object in this short paper will be to supply that information. In 1815 the Colonial Wool Trade did not exist, and England was obliged to go to France and Germany for wools. At the present time the tables have been quite reversed, and France and Germany are large purchasers in our market, whilst the importation of their wool for our use has nearly ceased.

It has been said that the value of the wool produced in our colonies and sold annually in London is 15,000,000*l.*

The following table of the exports of the principal wool-producing colonies in 1871 accounts for over fourteen millions in that year:—

	Quantity of Wool exported.	Value.
	lbs.	£
New South Wales	48,748,092	2,858,360
Tasmania	5,254,719	298,160
Victoria	76,334,480	4,702,164
New Zealand	37,793,734	1,606,144
Queensland	22,339,345	1,158,833
South Australia	28,539,567	1,170,885
Natal	5,763,999	172,806
Cape	46,279,639	2,191,233
	271,053,578	£14,158,585

Victoria and South Australia have been founded thirty-eight years, Queensland only fifteen years, and the Cape of Good Hope commenced its first export of wool fifty-four years ago, namely in 1820.

The bulk of this trade has therefore but recently come into existence.

The outlying districts of nearly all the Australasian Colonies and New Zealand were, in the first year of settlement, very early taken up as sheep and cattle runs. The native grasses, which grow in great luxuriance, are admirably adapted to the sustenance of sheep. Lands which are now covered with thriving

townships, and surrounded with cultivated farms were only a few years ago unpeopled sheep runs. Pastoral leases are now granted to sheep farmers of immense extent of territory in some instances, at a very moderate rental, and an assessment according to the number of sheep or cattle they are estimated to carry. These leases are generally granted for fourteen or twenty-one years, with distinct conditions, amongst others, that when the runs are required for agricultural purposes, the Government can resume them on giving six months' notice, and compensating the lessors for real improvements effected during their tenure of the land.

New South Wales was the first colony which imported Saxon sheep, and this Merino breed was introduced into other parts of the continent and New Zealand from the parent colony.

In Queensland, Tasmania, and the other colonies of the Australian group, the original Merino blood thus introduced has been preserved and improved by the systematic introduction of German rams.

In the last few years, however, there has been a large importation into all these colonies of Leicester and Lincoln sheep. In many cases these heavy wool-bearing sheep yield satisfactory results; but there can be no doubt that this great increase of cross-bred flocks will, sooner or later, depreciate the value of the shorter but finer Merino wool. The cross-bred wool is generally irregular, and the staple not very compact, whereas the staple of the Merino is of good length, stout grown, and sound.

In no country has the production of wool increased to so great an extent as in Australia—the actual increase within the last ten years has been more than 130 per cent.

With regard to the Cape of Good Hope, it is an interesting fact that it possesses a native sheep, which is however *not* a wool-bearing animal, but that immense flocks of these creatures have, by the introduction of numbers of fine Burgundy rams, been converted into wool-bearing sheep.

In 1820 the value of wool sent from the Cape was 690*l.* In 1872 the value was 3,275,150*l.*

It was not until 1827 that the value of sheep-farming began to be thoroughly appreciated at the Cape, and it was not until some years later that any large and regular annual importation of foreign rams was commenced, the result of which has been that most rapid progressive production which is shown in the preceding figures. The number of wool-bearing sheep at present in the Cape exceeds 8,000,000, and the number of native or fat-tailed sheep is only 1,500,000. In addition to the large export of wool from the Cape of Good Hope, there is an annually increasing export of Angora hair. Angora goats were introduced in 1856 from Asia Minor, and 876,860 lbs. of hair were exported in 1872, of the value of 58,800*l.*

It may not be generally known that the spinning of this hair into yarns is performed in Yorkshire. The finer sorts are exported to Lyons and used in the manufacture of lace. A great quantity goes also into Germany, and is used for dress goods. The coarsest kinds are made into stuffs, which eventually are converted into imitation fur and seal-skin for ladies cloaks.

The trade in Angora wool will ultimately be, without doubt, a very important one.

W. ROBINSON, F.R.G.S.

Reviews.

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GEOLOGICAL SURVEY OF INDIA.*

DURING the year 1873 the Geological Survey of India suffered from the enforced absenteeism and sickness of its members. But in spite of this, much valuable work has been done. Mr. King has examined the Beddadanole coal-field, and discovered, to the west of Rajamandri, some fossiliferous zones of marine beds which form an important link in the geological history of India. Under the guidance of Mr. Hughes, two pits have been sunk to the coal in the Wardha coal-field in the basin of the great Godavari River. Mr. Medlicott's, the officiating superintendent, examination of the Satpura coal-measures, was interrupted by having to superintend borings in the Narbada Valley, a class of work which should be apportioned to officers of the Public Works Department. In South Behar Mr. Mallet was engaged on the examination of the crystalline and metamorphic rocks; and, judging from the results, there appears to be no marked break between the quartzite and slate series of Behar and the gneiss of Bengal. A peculiarly close sequence of formations has been hit upon by Mr. Wynne in the ground to the north of the Salt Range, a feature which will be better understood when the long stretch of mountains between the Jhilum and Ravi have been explored. On the south-east of India, Mr. Theobald has completed the survey of Pegu, commenced in 1860. To the east of the Salwin, the country has not been surveyed topographically, and most perplexing difficulties were encountered by the geologist. The rank tropical vegetation, and the softness of the rocks, created a uniformly deep soil, which prevented Mr. Theobald, for days together, from getting a fair section of rock. Fossils appear to be very scarce throughout Pegu. The south-eastern districts of the province, a totally distinct geological field, are formed entirely of crystalline and sub-metamorphic rocks, and give so much promise of metalliferous deposits, that Mr. Fryar, a mining engineer, has been commissioned to examine them. Mr. Theobald's work next season is to examine the great Sivalik mammalian fauna in the North-West Provinces.

The recent meeting between the Maharajah of Sikkim and Sir G. Campbell, the late Governor of Bengal, and the attempts to penetrate by Sikkim into Tibet for trading purposes, have brought this little native principality of late more prominently into notice. A topographical survey of the state is much to be wished for, but the limited budget of the Survey Department would not permit of a party being organized for this. There is, however, reason to believe that serviceable coal deposits exist in Sikkim, and Mr. Mallet has accordingly been deputed to investigate this point during the ensuing season.

Mr. Medlicott, during such time as he can spare for field work, will examine the recently discovered coal-measures in the Garo Hills. They are probably situate within an interior basin, the existence of which was not suspected, owing to the deficiency of our knowledge of the country. Until the last five years,

* Annual Report of the Geological Survey of India, and of the Geological Museum, Calcutta, for the year 1873.

these regions, about as distant from Calcutta as York is from London, were as little known as the remote parts of Central Asia, and this because of the savage propensities of our subjects there!

A competent metallurgist, Mr. Bauerman, has of late been visiting various parts of India, with the object of reporting on the practicability of iron manufacture in India of European methods. His investigations corroborate the conclusions arrived at by the Geological Survey and other authorities, that the Raniganj coal-field is the most promising place for a trial, and that the principal defect there is the flux, a deficiency which the Geological Survey by diligent search is doing its best to overcome.

An interesting, though it can scarcely be called a hopeful project has been set on foot by the Government of India in connection with geology. The disposition to open increased avenues of employment in the Civil Service to natives, has induced them to attach a few native students to parties in the field. These students have hitherto received little previous instruction except such as they could pick up from a text-book and by inspecting specimens in the museum. They may at the best be able to do such comparatively mechanical work as looking for outcrops of coal formations or for fossils. But for the important part of geological investigations, which requires a modernised mind, habituated to form inductive conclusions, a primitive mind and a temperament like that of the Indian native, to whom physical science is utterly distasteful, are most unsuited. For the ensuing season four of these apprentices (all from Lahore College) are appointed to accompany the field surveyors.

In the first number of last year's *Records* there is a sketch of the geology of the North-West Provinces, the only part of India which has been entirely, though more or less cursorily, visited. The second gives us a map and description of the Bisrampur coal-field, which will assume importance when the direct route between Bombay and Calcutta is established. An interesting statement of the coal-measures of different countries as compared with India, finds place in the third, as well as a description of the brine springs of Pegu, which are now being fast superseded by the manufacture of sea-salt and the import of foreign salt into British Burmah.

To avoid clashing with his deputation to Yarkand, the *Palæontologia Indica* were brought out by Dr. Stoliczka early in the year, and the results have fully sustained the previous credit of the work. A most important geological collection was, through the exertions of some of the officers, got together and placed in the Vienna Exhibition.

Dr. Oldham himself, the accomplished Superintendent, after twenty-two years of continuous service, has been compelled to take sick leave to Europe. Others in the same branch of the service have been more or less impeded by the ill-health which so continually besets them. It is impossible, in reading these records of the labours of the Geological Survey of India, to refrain from admiration of the untiring energy displayed by its members under circumstances of so harassing a character.

ON THE TEMPERATURE OF THE ATLANTIC.*

THE scientific voyage of Her Majesty's ship 'Challenger' is already bearing rich fruit—and continuing the somewhat unnatural, though tolerant, expression, of a voyage bearing fruit—although this fruit may be said to have been plucked before it is ripe, it is still of such growth and flavour as to be particularly gratifying to the palate, and such as to cause us to look forward to the greater pleasure of enjoying it when fully ripe.

This fruit then, as plucked by Dr. Carpenter, relates to the physical condition of the ocean depths in its circulation as revealed by its temperature at various depths, and for the development of which Dr. Carpenter is indebted to a valuable selection of extracts from Captain Nares's official reports, printed and circulated by the Lords Commissioners of the Admiralty, and which reports are accompanied by abstracts of deep sounding and graphic diagrams of ocean isotherms.

Dr. Carpenter refers to the prevalent belief which prevailed a few years back, in the uniform temperature of the deep sea being 39° Fahrenheit, and to the fact that this theory had been dispelled by the temperature investigations carried on in the 'Porcupine,' in 1869 and 1870, with the protected thermometers. A comparison between the temperature of the deep water of the Mediterranean and that of the oceanic water in the same parallel of latitude, the former being almost uniform and the latter the reverse, drew the attention of Dr. Carpenter to study the causes, and on which he based his theory, of the Polar water being the *primum mobile* of oceanic circulation, by a constant flow from the Polar regions setting at the bottom towards the Equator. This flow, by reducing the level, causes an indraught of surface-water from the circum-polar area, which, in turn, draws from the temperate and the latter upon the intertropical. This theory or doctrine Dr. Carpenter considers to be fully upheld by the researches of the 'Challenger.'

The first temperature-section across the Atlantic from Teneriffe to St. Thomas's, shows at its western end an exact conformity to the observations previously taken off the coast of Portugal. A remarkable feature is the uniformity of the depth at which the temperature of 49° was reached, especially as the western extremity is 10° further south than the eastern.

"Below this depth, a remarkable change shows itself, in the gradual upward slope of the isotherms of 45°, 40°, and 39°; so that the latter temperature, which was entered at the eastern end at 1000 fathoms, is encountered over the deepest part of the western basin at 850 fathoms, and the strata of 50°—45° and 45°—40° are by so much thinner. But the most significant phenomenon is the depression of the *bottom*-temperature from its remarkably uniform level of 35°·5 in the deepest portion of the eastern basin, to 34°·4 in the deepest portion of the western. This depression, taken in connection with other facts, clearly indicates that an under-flow of *Antarctic* water extends as far as St. Thomas's."

Leaving the sections north from St. Thomas as not bearing so much on the grand system of circulation, the second temperature-section across the Atlantic, from Bermuda to the Azores, still bore testimony to the correctness of Dr. Carpenter's views, the lowest bottom-temperature being 35°.

"The most noticeable feature in this section is the extension

* A paper read at the Royal Institution of Great Britain, by William B. Carpenter, M.D., LL.D., F.R.S., on Friday, March 20th, 1874.

of the thick layer of 60°—65° as far eastwards as long. 41° W.; and then its rapid thinning, by the approximation of the isotherm of 60° to the surface. At the same time the isotherm of 40° gradually deepens; and the four intermediate bands resume nearly the same proportions that they present in the eastern part of the section from Teneriffe to St. Thomas's. Thus it is obvious that there is a much larger quantity of heat in the upper 300 fathoms of the *western* half of the Atlantic, between about lat. 25° N. and lat. 40° N., than there is in the *eastern*; and this is attributable to the reflux of that portion of the great Equatorial Current which never enters the Caribbean Sea or the Gulf of Mexico, but which, striking against the line of the West India Islands, the peninsula of Florida, and the coast of Georgia, is first deflected northwards, and then turns eastwards towards the Azores and the coast of Africa,—thus completing that *horizontal* circulation in the North Atlantic which is initiated by the Trade Winds. It is quite a misnomer to speak of this as "a branch of the Gulf Stream," since there is no evidence that it either enters or comes out from the Gulf of Mexico."

After proceeding to Cape Verde Islands, the voyage was continued to a position in latitude 3° N., and longitude 15° W., and the feature in this section most striking is—

"The progressive diminution in the thickness of the stratum above 40°, notwithstanding a progressive increase in the surface-temperature from 71° to 79°, consequent upon the approach to the Equator. Thus the isotherm of 40°, which at Madeira lies at about 900 fathoms' depth, and which halfway towards St. Vincent is about 950 fathoms, rises to 650 fathoms at St. Vincent, and at the Equatorial position actually lies at a depth of no more than 300 fathoms, below which, down to 2500 fathoms, the whole under-stratum has a temperature that falls very gradually from 40° to 35°."

The next section was carried obliquely across the Equator to St. Paul Rocks, Fernando Noronha, and Pernambuco; here the thinness of the stratum above 40° is most striking in comparison with the other sections, while the bottom temperature is colder, there being 33°·2 at 2275 fathoms, and 32°·4 at 2475, another proof of the Antarctic source of the bottom water.

Between the Abrolhos Banks and the Cape of Good Hope, the lowest bottom temperature on the western side of the Atlantic was 33°·1 at 2350 fathoms, and 32°·9 at 2650 fathoms on the eastern side; that a higher temperature should be found than at the Equator was not expected, but as the soundings were taken at widely separated stations, it is supposed that a deeper channel, with colder water at the bottom, exists between them.

The diagram of the isotherms in a north and south direction, illustrating the paper, clearly indicates the flow of the Antarctic water towards the Equator and North Atlantic.

The *rationale* of these phenomena is thus explained by Dr. Carpenter:—

"That any water which is *colder* than the Isocheimal (or lowest mean winter temperature) of the latitude, must have come from a source more distant from the Equator; and that if such water has a *glacial* temperature, it must have come all the way from one of the Polar areas."

It is but right to say that Dr. Carpenter submits that he has established a strong claim for the *provisional* acceptance of the doctrine, and he anticipates that this claim will be greatly strengthened by the temperature-section between the Cape of Good Hope and Melbourne, together with the north and south section between Kerguelen Land and the Antarctic ice-barrier.

To those interested in the physical condition of the ocean, and the somewhat vexed question of its circulation, this paper will prove a valuable contribution.

EXPERIMENTAL MILITARY SURVEY OF THE RUSSIAN CONFINES IN ASIA.*

III.

THE fifth and sixth sections of the Russian Asiatic confines, according to Colonel Veniukof's subdivision, form the line which passes from the Argun River at Abaigatu—the extreme western terminus of the Amur line—to Kuitun Mountain, at the point where the great Altai Mountains are intersected by the Little, or *Ektak*, Altai—a range which separates the Irtysh river system from that of the Kobdo.

The length of these two sections is 2100 miles. The greater portion of this frontier line, namely 1683 miles—from Abaigatu to Shabin-dabaga—was defined with great minuteness by treaty with China in 1728 (Count Raguzinskia, Kiakhta), and that definition was embodied again by Kropotof in the treaty of 1768, with but very little alteration; it was therefore established before any other boundary line between China and Russia, and is, moreover, the only section of the entire extent of the Russian borders in Asia which has been adhered to with an unwavering fidelity. From the earliest period named to the present time there has rarely been occasion for communications between the Russian and Chinese Governments on matters concerning trespass across this line, notwithstanding that nomads and hunters have always occupied the bordering lands on both sides. It was, however, only from lack of incentive to push forward in this direction that Count Muravief did not, in 1856, avail himself of the thirst for encroachment which was then so prevalent in Eastern Siberia. Strong representations were made to him on the subject, and it was argued that the treaty signed at Peking on the 20th of August (1st of September) 1727, might be employed in justification of the annexation of the basin of the lake Kos-Ogol, where gold-dust was reported to have been discovered by an enterprising Russian gold seeker. An officer who, in 1857, was deputed from Irkutsk to examine the outlying country in question, confirmed the previous accounts of it, and recommended its absorption by Russia. The Governor-General of Eastern Siberia would not, however, lend himself to so senseless a scheme, started by motives of selfish interest; at the same time he had on hand the completion of the grander design for the extension of Russian dominion along the seaboard of the Pacific.

The fifth section of this frontier terminates in the west at beacon No. 14, on the summit of Kyzynyktu-dabaga (N. lat. 51° 7′, and long. 119° 46′ E. of Ferro). A very short extent of it passes along ridges of mountains and other natural features of limitation, the greater length being drawn across an open country and constituting a so-called treaty boundary. The valley of the Selenga, the Yablonnoi range, and the Onon River break this line into four minor sections. Thus, the Trans-Baikal border land, which belongs to Eastern Siberia, comprises the districts of Nerchinsk, Chita, Selenginsk, and Verkhne-Udinsk, all of which, excepting Selenginsk, are called after small tributaries of the Selenga, Ingoda, and Shilka, at whose mouths the respective chief towns of those districts are situated. The northern half of the Trans-Baikal country, simi-

* Opyt Voënnago Obozrenia Rouskikh Granitz v. Azii.

larly to a very large proportion of Russian territory in other parts of Siberia, is held to be an almost impassable wilderness of mountain and forest; it is far removed from the frontier, and is consequently denied participation in the trade which animates the few roads connecting the main centres of habitation in the south. The western extremity of this region, namely the territory lying to the west of the Selenga, and between the frontier and the southern end of Baikal, presents the appearance of a table-land, with a height of about 2000 feet, rendered fantastically dreary and desolate by a superstructure of jagged and bare rocks, among which there are many elevations of a very regular conical shape. The tract of land in question is frequently visited by earthquakes, which have produced an alteration of the course of the Selenga; this river has found a channel to the east of its former bed, from which it is separated by a row of high undulating hills. The country around the Baikal exhibits unquestionable evidence of volcanic action. Some of the ravines are filled with great masses of lava ejected from the various craters in the mountains, and hot springs are found in numerous places. The last fearful earthquake occurred in 1861, the shock of which was felt within a radius of fully 400 miles. According to a Mr. Stakheyef, the wells ceased to give water, emitting sand and gravel in its stead. The whole of the Trans-Baikal region is an upland with ranges of mountains more or less parallel with the frontier, stretching from W.S.W. to E.N.E.; the greatest depression is the basin of the Baikal, the "Holy Sea," with an almost unfathomable depth, which is 1316 feet above the level of the ocean; the highest mountain has an elevation of 8259 feet above the ocean level; this is the Chokonda, near Nerchinsk, in the Borchovochnoi Mountains, which skirt the Shilka. Radde calls this mountain Sokhondo, after the Tunguzes, who derive the word from Sokho, head or summit. Colonel Veniukof estimates the average elevation of the land at 3000 feet above the sea level, or rather says that would be the general altitude of the plain surface if the country could be levelled to a uniform height.

The mountain chains here are the south-eastern extremity of the Sayan, the culminating point of which occurs at Munku Sardyk (11,400), between Kos-Ogol Lake and the sources of the Irkut River. The direction of this portion (400 miles) of the Sayan chain is south-east, until it reaches the meridian of Kultuk on the Baikal; here it separates the affluents of the Angara from the head-waters of the Selenga. A little to the west of this meridian the Sayan forks into two branches, the main chain still proceeding S.E. and forming the southern limit of the basin of the Djida; the other branch, called the Khamar-daban, turning first due east and then north-east, forms the southern shore of the Baikal. These mountains rise to a height of from 4000 to 7000 feet above the sea level. The humidity here is extremely great; hardly a day passes without a shower or two or a fall of snow every day according to the season of the year, the consequence is an abundance of forest, or perhaps the moisture arises from the great quantity of forest in the mountains and from the swamps in the ravines—the prolific sources of innumerable streams. The mountains here do not exceed an elevation of 7000 feet, although they preserve a uniform height along the whole of the south-western coast of the Baikal. The highest peak known in this mountain mass does not reach the average altitude of the chain, and the summits are not covered with perpetual snow. The northern declivities of these mountains are invariably steep, while the southern sides are sloping. Moreover, the northern sides abound in torrents, while the southern slopes, affected by the dry atmosphere of the Mongol Steppes, yield few and inconsiderable streams. In the same way the northern declivities are densely forested, while the southern slopes are bare and mostly sterile.

On the right, or western, side of the Selenga, there is an entire system of parallel mountain chains. The Kentei and the Yablonnoi Mountains form one continuous chain, which merges into the Stannovoi range further north. The Yablonnoi range may be called the back-bone of the Trans-Baikal country. It is inferior in height to the Sayan at the western extremity of the region, its greatest elevation of 5000 feet occurring in the Kentei mountain knot. At its southern extremity the Yablonnoi range averages a height of 4000 feet, with precipitous sides all along the valleys of the Chita and Ingoda Rivers. The river systems of the Uda, which flows westwards to the Selenga, and of the Vitim, which runs northwards to the Lena, are separated by what may be likened to a gigantic fungus, grown out, as it were, from the Yablonnoi range at its central part. This is an immense swollen surface, called the Eravin Steppe. It forms an almost imperceptible water-parting between the above-named systems, and at one time it was possible to pass in boats from the Khilok, another affluent of the Selenga, to the Mongoloi, a tributary of the Vitim, through the series of lakes which are the common sources of those two feeders.

The valleys which separate the mountain chains of the Trans-Baikal region are those of the Selenga, or Tola-Selenga, Uda, Khilok, Chikoi, Ingoda, Onon, and Shilka Rivers, with those of their tributaries. These are mostly narrow, being on all sides walled in by mountains. With the exception of the Selenga, of the Ingoda from Chita, and of the Shilka from the point of junction of the Ingoda and Onon, these rivers are not navigable. Small boats and shallow craft can pass down the Khilok, and down the Onon from Akshi; but there are few such vessels afloat on their waters. There is no organised steam navigation either on the Selenga, the Ingoda, or the Argun. On the Shilka it is otherwise; but even on the latter river, as on the other navigable streams, the only plain craft on the broad bosom of their waters are barges of very frail construction, which are used for floating down tea from Kiakhta, or rafts for bringing down cattle to Nerchinsk and to the Amur. There is only one road connecting the Trans-Baikal region with Irkutsk, and consequently with the whole of Siberia. This was constructed in 1860: it passes round the southern extremity of Baikal Lake to the embouchure of the Selenga. The other trunk-roads are the one to Chita and Nerchinsk across the Yablonnoi range, and the other to Kiakhta; this latter is a carriage-road as far as the frontier (138 miles from Verkhne-Udinsk). From Kiakhta to Urga (207 miles) the road is not well suited for wheeled carriages, owing to the absence of bridges and to the flooding of the rivers.

The other roads are from Verkhne-Udinsk to

Kudar on the right bank of the Chikoi; from Kliuchefsk picket on the Djida to Shimbelik on the Chikoi; from Shimbelik to the Ingoda across the Yablonnoi range; from Selenginsk to Petrofski *Zavod* on the Khilok; from Nerchinsk to Abaigatu (214 miles); from Nerchinsk through Chindant on the Onon to the Kerulun in Mongolia (372 miles), and so across the Gobi; from the Upper Onon to the Argun (475 miles), this road passing along the frontier, is lined with Cossack settlements, to which, as is the case in most parts where the frontier is open, are opposed military settlements of Mongols. From Urga there is a bridle-path to Kos-Ogol (521 miles), which was traversed by Colonel Helmersen, and a road for pack-animals to Verkhne-Ulkhinsk picket to the Onon (245 miles). From Urga there is a road on the Kerulun at Dalai-Nor (534 miles). Beyond Kerulun there are four well-known routes leading to Inner Mongolia.

Atkinson mentions a route which he says he followed from Selenginsk across the Chikoi, into the Khingan Mountains beyond the Russian frontier. He leaves it to be inferred that he reached the Kirulun River. There is indeed such a route from the sources of the Onon by those of the Kirulun to Urga, but it is only traversable by pack animals. In reading Atkinson's travels, it should be borne in mind, when he diverges from the well-beaten tracks within the Russian limits, that the same distinction should be made between his, "hence *my* route," and "after this *the* route goes," which the geographer is advised by M. Stanislas Julien, to draw between "*il arriva*" and "*on arrive*" in his preface to the *Memoires* of Hiouen-Thsang.

The road across the Gobi between Kalgan and Kiakhta is the ordinary well-known trade route, but the country of the Khalkas has been rarely traversed by, and is but little known to, Europeans. Two modern travellers, an Englishman and a Russian, have, however, contributed very much towards the solution of some interesting geographical problems in this region. The one is Mr. Ney Elias, who last year brought home the results of observations for longitudes and latitudes taken on a journey from Kalgan through Uliasutai, and Kobdo to Biisk, in Russian Siberia. "These observations," as was remarked by the President of the Royal Geographical Society, when Mr. Elias's paper was read, "will enable us for the first time to lay down the geography of Central Asia on a mathematical basis." He was accordingly awarded the Gold Medal of the Society. The other traveller is Mr. Paderin, who, although mentioned last, was in Uliasutai four months earlier than Mr. Elias. While Mr. Elias came up from the south, Mr. Paderin travelled from the east, namely, from Urga. Pursuing the official road, Mr. Elias came nearer to the supposed site of Kara-Korum, the capital of the early Mongols, than Mr. Paderin, if among all the remains of ancient cities which are to be found in Khalka, those located by Colonel Veniukof, under the name of Kara-Korum (say lat. 46° 50′, long. 120° 15′ E. of Ferro), at the sources of the Orkhon, at a distance of 40 miles due north from a point on the Kalgan Uliasutai route, which, according to the figures of distances given by Colonel Veniukof on his map, is almost exactly 301 miles E. S.E. of Uliasutai, are actually the remains of the "city" in question. Within a mile of the right bank of the Tui on this route, Mr. Elias saw the ruins of a city or fortress, which was probably Soin-Noin, 47° N.E. of the Kara-Korum on Veniukof's map, and, at a rough guess, in lat. 46° 59′, long. 119′ 23° E. of Ferro.* Mr. Veniukof's location of Kara-Korum does not, however, agree with Paderin's statement as to its whereabouts, and the latter is positive that the ruins which he saw are those of the capital of Oktai and of Chingiz Khan—which he calls Khara-Kherem—or Khara-Balgasun. Colonel Veniukof, who published his work before Paderin's return to St. Petersburg, places Kara-Korum full 93 miles to the south-west of Ugei-Nor, while Paderin found them at two-thirds of that distance. These ruins, he says, are situated in a plain called Toglokho-Tolagain-tala. Having travelled 216 miles west by north from Urga to Tola, and across the Onon, Mr. Paderin reached the Ugei-Nor Lake. He had heard in Urga of the Ugei-Nor Lake, of the Morin-tologai Mountains, of Ulan-Chikhi, of the river Tamir, and of Khara-Balgasun, and prosecuted further enquiries about the locality when he crossed the Kharukh River. From Ugei-Nor he took fresh Mongol guides, and proceeded to the ruins, going S.S.E. After a sharp ride on horseback of about 4 hours across the Toglokho-Tologai plain, he came to the ruins, 50 to 60 versts distant from the station-house on the Ugei-Nor, at the south-eastern extremity of the plain, and standing some 6 to 8 versts off from the western bank of the Orkhon. It may be as well, while on this subject, to give a few more particulars from Mr. Paderin's notes on a subject so interesting to geographers. A wide expanse of meadow stretches between the river and the quadrangular enclosure. The wall, which has on all sides a face of 500 paces, and which is in parts crenated, is constructed of clay and unbaked brick: it is 10½ feet high. There are the remains of an inner and lesser wall, running parallel with the north and south sides of the enclosure. On the eastern side of the enclosure there is a turret, or a mound, which overlooks the outer wall. On the south and west sides of the ruin there are fosses, which are occasionally filled with rain-water. Near to Khodasan station, which is close to the banks of the Kharuk River, there is a Khitin-Khermé, or a monastic enclosure, in which, according to the Mongols, once dwelt a Khamba. The earthen embankment is only 7 feet high; the buildings within are tall; the roofs have disappeared; the walls are chiefly made of black flag-stones, cemented with a sandy clay slightly intermixed with lime. The buildings are very solid. Some unburned tiles were evidently used in the construction of these edifices. There are no traces of a wall within this enclosure.

Mr. Paderin's route from Urga inclined first to the south, and lay across the Tola, Kharukh, Orkhon, the two Tamirs, and the Chiluta Rivers, and then across a pass into the lake system of the streams running west and north-west. Beyond the pass the road, which is called the Sumo-Urto track, emerged on the high road to Uliasutai. The total distance from Urga to Uliasutai along this road is 576 miles, or 31 stages. From Kara-Korum, if Mr. Paderin's identification may be recognised, the Russian traveller returned to his track, striking it at Ulan-Khoshu, a stage beyond Ugei-Nor, and proceeded along the Morin-Tologa (horse's head) mountains, and past Ulan-Chikhi (red

* We have not seen Mr. Elias's map and are obliged to go to print without referring to the *Journal of the Royal Geographical Society*, for this year, in which it is said to be published.

ear). Having thus far diverged from our special subject, it may not be out of place to add a short description of the country of the Ugei-Nor, from Mr. Paderin's notes. This country is a wide plain—the Toglokho-Tologain-Tala—surrounded by mountains of no great height. The lake lies on the northern side of the plain, near its hilly margin; the length of the lake from east to west is 8 miles; its breadth is about the same. The Khut'ukh'tu, Orombyin Gegen, resides in a building at the western extremity of Ugei-Nor, which appeared to Mr. Paderin to have been at one time the palatial residence of a khan. The foundation of this building, and the materials of which it is made, resemble those of the remains on the Khorukh. The Ugei-Nor is connected with the Orkhon by a stream called the Narin, which flows out of the lake. The Toglokho-Tologai extends about 50 miles from east to west, and is from 23 to 33 miles wide. It is intersected by the Orkhon, which is fordable, and which is skirted by salines and swamps, and fringed in parts with willows and poplars. On the western side of the Orkhon there is a series of salt lakes called Tsagan-Nors (white lakes), an appellation which the Chinese have erroneously extended to Egei-Nor, confounding the latter with the lakes of the Tamir River system. The mountains on the western margin of the plain are called Ulintu, Obotu, and Ulan-Khashu; the Khadamtu mountains, which are covered with coniferous trees, form the eastern and southern limits of the Toglokho-Tologain-Tala.

Mr. Paderin, who refers also to a dilapidated wall or embankment on the Sumo-Urto route, viz., at Chintologoi on the Tola River, found no remarkable fragments or monuments of the past at Kara-Korum. The Mongols, in reply to his enquiries, told him the place was very old, and that it must have been the place of residence of Chingiz-Khan, while a Lama explained that it was the site of the city of Tagan-Timour. The place is indifferently called Kara-Korum, Kara-Kherem, Kara-Koram and Kara-Khelin. By Muhammadan writers it was called Ordu-Balik (*D'Hesson Hist. des Mongols*, t. 1, p. 76), or Belasagun, now written Balgasun, which, Mr. Semenof explains, was only a title. Balgasun is only another form for Balgada, which means residence. It appears also to have been called Kara-Korin, Kara-Khorin (from a river of that name), or Konin, when first founded by Bi-Kia A.D. 755. In 1228, Oktai, the son of Chingiz-Khan, made this place his head-quarters, moving from the banks of the Orkhon, where his father had permanently fixed his camp.

After this long digression, we will return to the Trans-Baikal region. The rivers are shallow, and the valleys, as we have said, are in rare instances open; this is particularly the case in Russian Daùria—the Nerchinsk mountain district—where, for instance, the Gasimur, Urof, Uriumkan and the Argun itself below Tsurukhotai, rush through mountain gorges, or wind through valleys not two-thirds of a mile wide. These are raw and unhealthy localities, which produce *goitre*. The country around the Barun-torei and Dzun-torei, and to the south-east of those lakes (between the Onon and the frontier), is covered with pools of stagnant water: this is an elevated steppe falling in gradients to the Dalai-Nor, which is itself 1800 feet above sea level. To the south is the high Gobi. At the sources of the Kerulun are the Kentei Mountains; the vegetation along the banks of this latter river is much poorer than that along the Onon, and it is everywhere fordable except in the spring; the Dalai-Nor is rapidly evaporating, and has no issue except when it is flooded.

The climatic conditions of the country are unfavourable to cultivation, a circumstance which is aggravated by the sparseness of the population and the rude condition of the people. The whole of the Trans-Baikal region embraces 228,900 square geographical miles of territory, and Colonel Veniukof observes that of this area barely 25,200 square miles are suitable for purposes of agriculture. The inhabited portion of this Russian outskirt may, however, be said to measure 600 miles in length by 270 miles in breadth, which gives the Russians 54,000 square miles of border land, with a more or less settled population. The inhabitants of this border may be said, however, to number not more than 388,000, of whom 260,000 are Russians; these are chiefly grouped in large towns and villages in the basin of the Selenga, and scattered throughout the Nerchinsk district. Next in number are the Mongols and Buriats. The wealth of the aborigines consists in their herds and cattle. According to Colonel Veniukof's estimate, they possess in the aggregate about 400,000 horses, 500,000 head of horned cattle, and over a million sheep. This in itself is enough to convey a fair idea of the character of the country and of the condition and form of life of the people. The most industrious class among the Russians are the so-called "families" of old believers on the Khilok and Selenga, in the Nerchinsk district, on the Ingoda and Argun Rivers. These people content themselves with labouring on the soil, although they find it exceedingly difficult to dispose of their produce, owing to the want of proper ways of communication. Their cattle are the best in the region, but are small; these, however, are sent in great quantities down the Argun to the Amur. There is no manufacturing industry in the region. Mining and gold washing occupy the chief attention of the Russians. The quantity of gold-dust obtained in 1869 was 382 puds, valuing about 4,000,000 roubles. The working of the silver mines had almost entirely ceased, and only 40,000 to 45,000 puds of iron ore were obtained, and that at the Petrofski *Zavod* alone.

Regarding the Trans-Baikal border-land in the light of a probable theatre of war, Colonel Veniukof observes that it is divided into two such fields for operations which are in no way connected one with the other. To the west of the Yablonnoi range, the valley of the Selenga and the Khamar-Daban Mountains are the only features of strategical importance; the valley of the Selenga could alone serve as a basis for operations whether defensive or aggressive, while an enemy could penetrate into the country from all points along the line of frontier, and the Trans-Baikal region could be successfully held against a powerful enemy, only so long as the passes across the Khamar-Daban are commanded from the north. The defile through this range at Verkhne-Udinsk is not guarded at all, so that a bold Chinese general might any day cut off the greater portion of the Trans-Baikal country, as well as the entire province of the Amur from the rest of Siberia. To the east of the Yablonnoi range the character of the country as a field of military operations is quite different. This arises from the circum-

stance of the rivers there running parallel with the line of frontier, and from the greater quantities of forest on the mountains; here, too, the population is more evenly distributed. There is here no such naturally defined line of operations like that of the Selenga. In the event of a war with China, troops might be concentrated at Chindant, and from thence moved on to Khailar, along the frontier. The Cossack troops on the Trans-Baikal frontier consist of six cavalry regiments, nine battalions of infantry, and one battery. The arsenal of the circuit of Eastern Siberia is at Chita. The arms for the Cossacks are brought from St. Petersburg, whither they are also sent for repair.

The country beyond the Russian frontier in this direction is Khalka, or Northern Mongolia. The Mongols are governed by Ambans in Urga; among these, however, the senior is invariably a Mongol, the second being a Manchu. These Ambans wield only a political power. The internal administration among the Mongols is in the hands of the Khans—Tsetsen and Tushetu—whose lands border this section of the Russsan line; in those of chiefs of banners—dzasakams (subordinate to the former)—and in those of the Khut'ukh'tu of Urga, who is a mere puppet in the hands of the Manchus. Tsetsen and Tushetu have their residences on the Kerulun and Onon Rivers. The Mongol forces, or militia, in Khalka number 15,000, the population in this part of Chinese Mongolia being 213,000 persons, grouped over a stretch of country having a width of 200 miles from the Russo-Chinese frontier.

Without stopping to describe the process of rectifying the frontier marks which is periodically gone through by the Russian and Chinese official, we must now pass on to the Altai-Sayan section of the Russo-Chinese frontier, over which, however, our space will not allow us to linger long. As a political frontier, it might perhaps be best described in a list of the 122 piles of stones and other marks which define it along the ridge of the almost impenetrable range of mountains from the sources of the Irkut, Belaya, and Oka rivers in Eastern Siberia.

The results of the observations made for altitudes at the eastern extremity of this chain by Mr. Radde in 1855, have been given by that eminent zoologist and botanist in his valuable reports to the Russian Geographical Society, of which I purpose shortly to publish a full translation. The Munku-Sardyk mountain knot, at the sources of the rivers above named, has a height of 11,400 feet above the level of the sea; yet, according to Radde, it does not rise much above the neighbouring ridges. After Pallas, in 1772, and the naturalist Turchaninof—1828 to 1836—Mr. Radde was the first to carry scientific exploration into this region. The Altai-Sayan range separates the country of the Urian-Khai Mongols from Siberia so effectively that it affords easy ingress only at its western extremity. There are, however, fourteen known passes across the Altai-Sayan chain. The routes here which lead to the south are those from Ust-Kamenogorsk to Kobdo; from Biisk to the Kak or Khak picket-post at the sources of the Kobdo River. The route from Ust-Kamenogorsk connects all the Russian settlements along the Altai in this section of the frontier, and in the 17th century it formed the so-called Biisk line of frontier—492 miles long. The Shabin-Dabaga mountain knot — famed for the earliest mark limiting the Russo-Chinese frontier in this direction—stands at the sources of some affluents of the Abanan, Yenisei, and Kemchik rivers. There is here a very difficult pass into the country of the Urian-Khais which leads to the river Ak. Atkinson's illustrations give an excellent idea of the grandeur of the scenery in these mountains, although he did not penetrate far into them.

With the exception of a very few settlements, there is hardly any Russian population within 100 miles of this line, which is the most secure section of the entire Russian Asiatic frontier. The Russian military forces here are very slender, and those of the Chinese still more insignificant, nature having supplied the elements for so secure and permanent a boundary as no human efforts have ever succeeded in fixing in Asia. But if the passes over the Altai are difficult or impracticable, the flank of the countries of the Kos-Ogol, Ubea, and Ike-Aral, water systems, can be easily turned from the Bukhterma and other points at the eastern extremity of the Russian Semirechensk province. The valley of this river is the best locality in the Altai region, but this is as yet an undeveloped corner of the Russian Asiatic possessions. Some interesting papers have been drawn up by Russians, on the routes from Biisk and elsewhere in Siberia to Kobdo and Uliasatai. Among these is a paper written, in 1864, by Mr. Printz on a journey to Kobdo by way of Suok, which we dare not more than allude to, having already we fear drawn this notice to too great a length. We are here reminded of the necessity to close, and although we do so abruptly, we find an excuse in the brevity with which the Altai-Sayan section of the frontier is treated by Mr. Veniukof, not, doubtless, because of the paucity of geographical material to work upon, but because of the little interest this section offers from a military strategical point of view.

The mineral wealth in the Altai is exceedingly great, but the mountains are not made to yield more than a very small proportion of their immense natural wealth. According to the ancients, here somewhere dwelt the Argippiæ; the Issedones probably occupied the lands on the south side of the Altai's, beyond which nothing could be gleaned by Herodotus from those people. This, too, was probably the country of fabulous wealth possessed and defended by the "Gryphins," or Gryphons. Here, if anywhere, lodged the mythic Arimaspians, or one-eyed people; and this, we presume, was the awfully grand mountainous region of Gog and Magog, of which we know as little as though it had not been in European hands for upwards of a century.

ROBERT MICHELL.

(To be continued.)

THE COMPETITIVE GEOGRAPHY, by *R. Johnston*. Second edition. 8vo., pp. 520. London (Longmans & Co.), 1874.

WE dare say Mr. Johnston's treatise on geography will be acceptable to teachers and candidates who present themselves at the competitive examinations held periodically for entrance into the Army and Civil Service. It is a volume of small bulk, yet it contains an immense amount of information, arranged perspicuously, and to be depended upon as a rule. The author claims the forbearance of his readers with respect to any slight

inaccuracies which may be found in his work, notwithstanding all efforts to exclude them, and we think he is justified in doing so. But forbearance must have its limits, and sometimes Mr. Johnston tries our temper to an extent almost beyond endurance. Where, for instance, did he learn that, Jeb-Ahloor is the highest mountain in Africa; and why will he persist in giving the number of inhabitants of countries, without mentioning the year to which the information applies? The list of British Colonies, too, requires amendment. The omission of small places, such as Ascension, Lagos, and Ceylon, may possibly be forgiven, but it is too bad that the results of the Imperial Census taken in 1871 should have been neglected almost altogether, and that Bengal, with its 66,856,859 inhabitants, should figure in his list with a population of only 35,321,000. The figures throughout the volume should be carefully revised, and the book may then become a trustworthy guide to the student.

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THE HISTORY OF JAPAN FROM THE EARLIEST PERIOD TO THE PRESENT TIME. Vol. 1. To the year 1864. By *F. O. Adams, H. B. M.'s Secretary of Embassy at Berlin, formerly Chargé d'Affaires at Yedo.* London (King & Co.), 1874.

MR. ADAMS intends his work to be a "comprehensive narrative of the principal events in Japan, from the earliest period up to the present time." He devotes the first hundred pages of the present volume to a sketch of the earlier history of Japan to 1852, and the remainder to the more recent occurrences. He claims to have compiled his work from the best official and native sources within reach, and we are happy to be able to congratulate him upon the clear and readable narrative of events which he has produced, and which cannot fail to attract the attention of all persons interested in Japan, and the East generally. The author deserves credit, too, for the care which he has bestowed upon the spelling of proper names, a subject which many of our more popular writers seem to look upon as being beneath their notice.

But whilst thus fully admitting the merits of Mr. Adams' work, we cannot help taking exception to the cursory way in which certain passages of Japanese history are treated. Considering that Japan is one of the most ancient empires in the world, that her historical records date back for many hundred years, and Europeans first came into contact and conflict with her as early as the sixteenth century, we think a hundred pages hardly sufficient to do justice to this earlier history up to 1852. The author has based this part of his work almost exclusively upon Japanese sources, rendered available by Mr. E. Satow, the learned secretary of the English Legation at Yedo. He has not thought it worth while to consult the voluminous materials published by Siebold, whose work, in spite of all that has been published since, still remains the standard authority on many subjects connected with Japan, or the scattered notices to be found in earlier writers. The interesting episode of the introduction of Christianity into Japan, and its subsequent extirpation, is thus passed over very lightly, much to our regret, for we feel sure that even a small amount of historical research would have thrown fresh light upon this epoch of Japanese history, which gains in interest from similar conflicts between Church and State now going on before our eyes. Passing to a more recent period, we feel surprised that Russia should not be mentioned once in the pages of this volume. There is no account referring to the transactions between Russia and Japan since 1792, not a word about Putiatin's mission in 1857, nor about Russian encroachments on Sakhalin and in the Kurile Islands. Surely Mr. Adams's official position does not satisfactorily account for this singular silence.

On the other hand, everything referring to the transactions between Japan and England is discussed fully; the official despatches are frequently given *in extenso* (though without the plans accompanying them), and we can only repeat that the work is full of information and eminently readable.

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I. DIE DEUTSCHE EXPEDITION AU DER LOANGO KUSTE NEBST ALTEREN NACHRICHTEN UBER DIE ZU ERFOSCHENDEN LANDER. *Von Adolf Bastian*, Jena. 8vo., 374 pp. London (Trübner & Co.), 1874.

II. CORRESPONDENZBLÄTTER DER AFRIKANISCHEN GESELLSCHAFT. Nos. 1 to 6.

IT was chiefly through the travels of Livingstone and Schweinfurth, that, in 1872, the attention of the Berlin Geographical Society was turned to the great desirability of exploring equatorial Africa. Communications were entered into with other German Societies, and delegates from Leipsic, Dresden, Munich, Frankfort, and Hamburg, having assembled in Berlin, the German Society for the Exploration of Equatorial Africa, was formally organised on the 19th of April, 1873; and Dr. Bastian, the ex-president of the Berlin Geographical Society, a gentleman well known for his travels in Siam, Cambodia, China, and the Indian Archipelago, as well for previous acquaintance with that very part of the African coast it was now proposed to start from, was deputed to look for a suitable spot to erect a coast station at. In the volume he has just brought out Dr. Bastian details his experiences, and the information he acquired during his three months' sojourn in the coast lands, a task not fulfilled without severe physical prostration through fever. But before noticing his labours it may be convenient to glance at the programme of operations determined on by the Society and the steps taken to carry it out.

As already stated it was probably the success of Dr. Schweinfurth that encouraged his countrymen to follow in our wake, by organizing a second "African Association." The commercial prizes to be won were great, and since the abolition of the West Coast Slavery, the Dutch had actually made a commencement by building a few factories. Copper, ivory, wax, tamarinds, groundnuts, coffee, cotton, gum copal, palm-oil, and various kinds of dyes were amongst the products which the country yielded, even to profusion. The object to be sought was the eventual thorough exploration and throwing open to trade of the huge blank on the map of equatorial Africa, by starting from a basis established on the coast, and thus connecting by a network of routes, the extreme points reached by Du Chaillu, Schweinfurth, and Livingstone.

An energetic leader for the expedition was found in Dr. Güssfeldt (whose qualities, it may be observed, Dr. Bastian extols in the highest terms), his companion being Herr Von Hattorf; while Drs. Falkenstem and Soyaux were appointed zoologist and botanist respectively. Furthermore, Dr. Lenz, a geologist, has been despatched to the mouth of the Ogowai River, with instructions to work inland in concert with the Loango Coast Expedition. The unlucky mishap which befell the 'Nigritia,' — Drs. Güssfeldt's and Von Hattorf's vessel—just after leaving Sierra Leone, was chronicled in our columns, and will be fresh in the memories of our readers. Eventually, however, Bananas was reached on the 25th of July, and shortly afterwards they met Professor Bastian and Von Görschen at Cabinda. Bastian, in the meantime, had been exploring the coast lands, with the view of selecting a suitable site for a depôt. Futila, the Chiloango River, Landana, Chinsonso, Chikambo, Loango, and the Quillu River, were all visited in turn, and the advantages of each place are carefully discussed in the volume now before us. The Quillu River appeared very deserving of research. It is evidently an important stream, and, according to the native accounts, is connected with the

Zaire or Congo. The former kingdom of Loango has now shrunk to very insignificant dimensions, and embraces barely more than the country between the Quillu and Luema Rivers; a decline in the greatness of monarchy chiefly attributable to the levelling tendencies of legitimate trade. Formerly, the slave-trade was a monopoly vested in the hands of the princes and chiefs, but now every native can procure a gun and ammunition, and make himself independent, while the real power is centred in the hands of the richest traders. At last an empty Dutch factory was discovered at Chinsonso, and communication with the interior being practicable, and Landana, which is now a thorough European settlement, being within easy distance, it was determined to settle there,. and after some necessary repairs, the house, containing a dining room, three small sleeping apartments and outhouses, was finally made habitable by the second week in October.

Dr. Güssfeldt then set out, on the 16th of October, for his projected preliminary journey up the Quillu River. After being detained for a short time at Black Point through fever, he began to proceed up-stream on the 26th of October, laying down a route survey as he went along by means of a chronometer, and prismatic compass. At its mouth the river has a bar, while the right bank has within the last five years been carried away by the force of the water, so that the site of some old factories is now under water. The average breadth of the stream is 400 paces, though in some rocky narrows close to Gotu, it shrinks in breadth to only 25 paces; 29 miles above the mouth, in a direct line, lies a trading station called Chimbak. Here Güssfeld trested four weeks, living in a sort of shed built on piles, and feeding on cassava, fowls, and palm-nuts. From thence he proceeded up as far as the Bumina rapids, the narrowness and rocky nature of the stream making travelling a very slow affair. After some progress up-stream, Güssfeldt was in a position to ascertain the general character and course of the Quillu. It proved to flow first north-east and then north-north-east, its breadth averaging about 150 paces, and then to dash into a rocky channel no more than 50 yards wide, with high precipitous walls of rock on either hand. On observing this feature a little more attentively, Güssfeldt saw that here, as well as at Gotu, a little lower down, the Quillu breaks through one of the many parallel mountain ranges which run north-west and south-east. A journey of four hours brought him to the Mayombe country (not to be confounded with Mayumba, about 4° south latitude on the coast), and, after a friendly reception by the chief, Güssfeldt engaged a party of bearers to accompany him to the Yangela country, the limit of his excursion.

This journey of Dr. Güssfeldt is important, inasmuch as it will very probably be by this route that the Expedition will endeavour to penetrate into the interior. The rainy season, which, from last advices (dated 29th of January) had set in vigorously, will preclude all active operations for some considerable time. We hope, however, shortly to be in a position to lay before our readers an account of the further preparations and movements of the Expedition.

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REPERTORIUM VAN DE KOLONIALE LITERATUUR, ENZ; door *J. C. Hooykaas*, Ter prese bezorgd door Dr. W. N. du Rieu. Amsterdam, 1874. Part I. London, Trübner & Co.

THE ever increasing number of articles inserted in periodical publications and the transactions of scientific societies, render a bibliographical guide, such as the one now before us, of immense service to the student. Mr. Hokyas, the originator of this work, did not live to see it completed. He died in 1870, and the materials which he had been at the pains of collecting in the course of many years' research could not have fallen into better hands than those of Dr. du Rieu, the editor of the present work, and who has been assisted in his arduous task by Professor P. J. Veth, W. Marshall, A. C. Vreede and others. The work will contain references to papers of all kinds, referring to the Dutch possessions to the east of the Cape of Good Hope. The first part, now published, gives 4455 references bearing upon "the Land," and is therefore of special interest to geographers. The parts which are to follow will refer to "The People," "Administration," and "Science." A concluding volume will contain indices and a register of dates.

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DIE ARALSEEFRAGE. Von *Robert Roesler*, Corr. Mitglied der Kais. Akademie der Wissenschaften. Wien, 1873. 88 p.p., 8vo. London, Trübner & Co.

THIS work is a reprint of a most exhaustive essay (originally read before the Vienna Scientific Academy) on the Sea of Aral. The various points selected for discussion by the author are the following: the question of an original communication between the Caspian and Aral Seas, and the testimony on this head; the probable former courses of the Lower Oxus and Jaxartes; the question as to the existence of an ancient commercial route by water between the Caspian and Upper Baktria, and lastly, the proof extant as to the separate existence of the Sea of Aral in times past.

The author's researches have led him to examine every conceivable authority; Greek, Latin, Arabic, Persian, Russian, English, and German authors, all have been ransacked, and with all their writings and languages Herr Roesler appears equally familiar. The result of his investigations (which agree in the main with those of Sir R. Murchison, though formed independently) is to arrive at the conclusion that at a remote geological (not historical) epoch, the Aral and Caspian formed one common inland sea, and that the lofty Ust-Urt plateau gradually uprose between the two seas, which however still continued united by a common arm to the south, till a further upheaval of the soil effected a complete separation. The classic authorities (Herodotus alone excepted) make the Oxus discharge itself into the Caspian, and three of them agree in fixing the mouth opposite to that of the Araxes. It is impossible to tell for certain, but it is probable that one arm flowed northward and was lost in the sands, and the other westward to the Caspian, while it is also likely that after once reaching the depression of its present delta, the river never changed its course. The Arabian writers of about the 10th century after Christ, on the contrary, describe it as flowing into the Aral. A careful comparison of the data points to the conclusion that the change in the river's direction must have taken place between the 6th and 11th centuries of our era, and probably began as early as the year 330 A.D., though Roman writers are silent on the point. After the 14th century, the accounts respecting the course of the Oxus differ in rather a perplexing manner. Gonzalez Clavijo, Abul-Ghazi, Kyatib-Chelebi, and Hanway, speak of its return to the Caspian, while Jenkinson speaks equally positively of its flowing into the sea of Aral. On this point the author decides, apparently a little hastily, that the accounts are too unreliable to enable one to form a satisfactory opinion.

Herr Roesler does not deny that a trade route for the conveyance of Indian goods to the Caspian may have sprung up along the Oxus, but it must have been a mere temporary affair and subject to interruptions from physical causes.

This treatise is a most valuable contribution to the comparative and historical geography of the Lower Oxus, and it is impossible to refrain from admiration of the diligence shown in the accumulation of data, as well as of the judgment exhibited in its utilization.

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THE Atlantic Coast Guide: a companion for the Tourist between Newfoundland and Cape May. 16mo., pp. 136. Maps. New York, 1874. 5s.

EASTMAN'S Eastern Coast Guide: A hand-book of the Coast from Newport to Mount Desert. 16mo. Concord. N. H. 7s. 6d.

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Cartography.

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Maps of Norway.

THE facilities of travel attract to Norway a number of tourists increasing from year to year, and for their guidance, as well as for the information of geographers generally, we think a notice on Norwegian maps may prove acceptable at the commencement of the travelling season.

In Norway, as in most other countries of the world, the surveys and their publication are entrusted to a Topographical Department—in this special instance known as *Geografiske Opmaaling*—under the direction of military officers. The earliest publications of the Norwegian Topographical Office date from the year 1826, when a map of the Amt Smaalene was published on a scale of 1 : 200,000. This map, like some of those which succeeded it, was engraved at Paris, but at an early date the Norwegians began to do their own engraving, and there is no doubt that the work turned out at Christiania need not fear comparison with the work of Parisian gravers. This first map was succeeded, in 1829, by a map of Agershuus, in 1829 by one of Hedemarken, and in 1832 by one of Jarlsberg and Laurvig. For these earlier maps we are indebted to Captains N. Ramm and G. Munthe. It is to these officers that we are indebted for the harmonious combination of contoured and horizontal shading which forms a characteristic feature of all official maps of Norway down to the present time. There is no doubt that this system is adapted to the features of the country, and if applied artistically, none of those unpleasing contrasts are observable which might be expected—the barren mountain region, shaded horizontally, and the more gentle and cultivable hill-tracts* shaded vertically, being easily distinguishable without offending our idea of the beautiful in cartography. It is only natural that the first essays in this style should not have perfectly succeeded, and it therefore reflects no discredit on the officers named when we state that the maps done by their successors, Captains Gjessing and Andersen, surpass their workmanship in beauty of execution. This remark applies with peculiar force to Captain Gjessing's map of Stavanger Amt, published in 1860, which may be looked upon as worthily representing this style of delineation. We have given below the titles of these "Amt" maps published up to the present time, and it will be seen from this list that there remain still to be published maps of Northern Bergenhuus, Romsdaal, the two Throndhjems, Nordland and Finmark, the area of which is almost equal to one-half of that of the entire kingdom. The only map on a large scale which furnishes information with respect to this thinly inhabited portion of the kingdom is that of Finmarken prepared by W. Haffner, an officer of the Topographical Department, who has been able to avail himself of the surveys made in 1869 and 1870, by Captain Baug in the district of Tromsö, where boundary disputes had arisen between the nomadic inhabitants. This map extends from the Alten fiord to the Russian boundary, its nomenclature is abundant, and although the hills are but slightly sketched in, there are numerous altitudes to guide our judgment with respect to the orographical features of the country.† Another map of Finmark is that by J. Fries, published in 1861, which is perhaps the most minute ethnographical map ever published, for it shows every house or hut, and distinguishes the language or languages spoken by the inmates in a simple and comprehensible manner.*

The old surveys, however, were found not any longer to answer the more exacting requirements of our time, and a fresh survey was begun in 1862, when two baselines of about 12,000 feet each were measured at Christiana and Levanger, and a careful triangulation, with special reference to the requirements of General Baeyer, measurement of a European arc of a parallel was begun. The principal triangulation has been carried on uninterruptedly since that time, Professor Fearnley, of the Christiania Observatory, taking a leading part in it. The altitudes are determined trigonometrically or barometrically, according to circumstances, care being taken to check all observations, and we believe that the northern and southern series have now been connected in a satisfactory manner. The detail survey is carried on by officers of the Topographical Corps, of whom five to fifteen have been employed on that service annually since 1862. These officers have already surveyed 24,390 square miles, the share of each amounting to 210 square miles a year, by no means a despicable achievement, if the difficult nature of the country, and the fact that not only numerous altitudes have to be determined and contours laid down at intervals of 100 feet, be taken into consideration. As Norway has an area of 123,300 square miles, the survey, unless it proceed more rapidly in the future than it has done hitherto, will be completed only in the course of sixty years, which is a long time to wait for a good map of the country.

The results of this survey are being published, since 1869, on a scale of 1 : 100,000.† The topographical map of Norway is a work deserving the attention of topographers. It will consist ultimately of 54 sections of 4 sheets each, but its progress is exceedingly slow, no more than 5 sheets having been published up to the present time. Like other recent publications of the Topographical Office, this map is executed in chromo-lithography. Outline and writing are in black, the surface of fiords, lakes, and mosses, is tinted or shaded in blue, and the hills are in brown. The system of delineating the ground is similar to that described above in connection with the Amt maps. The barren, rocky mountain tracts are shaded in chalk; the more gentle slopes, capable of cultivation, are shaded on Lehmann's system, and the effect produced is more harmonious and satisfactory. At the suggestion of the late Colonel Sydow, contours at intervals of 100 feet will be inserted in future, as has already been done on sheet 14 D.

This map, though so different in style from the copper engraved maps of other countries, is nevertheless one deserving of the highest praise: it is most creditable to the department by which it is issued. Our only regret is that its progress should be so slow.

Amongst maps on a smaller scale, that of Southern Norway, on a scale of 1 : 400,000, occupies the first rank. It will ultimately consist of 19 sheets, of which the two sheets embracing the country to the south of lat. 58° 50′ N. have been published. The map is executed in chromo-lithography (hydrographical features being in blue, buildings in red), and contours at intervals of 500 feet are laid down upon it.‡

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* Amt-maps of Norway, published by the Geografiske Opmaaling:
By N. Ramm and G. Munthe:—
Smaalenene, 1 sheet, 1826; Agershuus, 1 sheet, 1827; Hedemarken, 3 sheets, 1829; Jarlsberg and Laurvig, 1 sheet, 1832 (2nd. edition, 1858).
By Gjessing and Andersen:—
Christiania, 3 sheets, 1845; Buskerud, 2 sheets, 1854; Bratsberg, 2 sheets, 1857; Nedeniis and Robygdelaget, 2 sheets, 1858-9; Stavanger, 2 sheets, 1860; Lister and Mandal, 1 sheet, 1862; Söndre Bergenhuus, 2 sheets, 1867 and 1870. Price 2s. a sheet.

† W. Haffner, Kart over Finmarken's Amt. 1:400,000. 2 sheets. Kristiana, 1870. 7s. 6d.

* J. Fries, Ethnografisk Kart over Finmarken. 6 sheets. Kristiania, 1861.

† Geografiske Opmaaling. Topografisk Kart over Kongeriget Norge. 1:100,000. 54 sections of 4 sheets each. Kristiania, since 1869.
The following sheets have been published: 10A, B, D, 14 B, D. Price 1s. each.

‡ Geograf. Opmaaling: Generalkart over det sydlyge Norge. 1:400,000. 18 sheets. Kristiania, since 1869. Sheets 1 and 2 have been published.

On a still smaller scale, but specially intended to meet the requirements of tourists and travellers generally, is the travelling map of the five Stifter to the south of lat. 65° N.* This map is likewise printed in colours; the water is blue, the cultivated tracts are tinted green, the barren hills grey, and the snow-fields and glaciers are left white. It conveys thus a very striking idea of the physical features of the country, besides which no feature of interest to the tourist, such as inns and post-houses, is omitted.

In addition to these official publications, there are two private road or travelling maps, based upon official sources, and carefully revised from time to time. These are the maps of Munch† and of Waligorski and Wergelander,‡ both of which embrace the whole of the country (Northern Norway being given on a reduced scale). On Munch's map the hills are shaded; Waligorski and Wergelander delineate the ground by means of contours.

We are not as yet able to report on a geological survey of Norway. Professor G. M. Keilhau has, however, published a geological sketch-map of Norway in his *Gaea Norwegica*, a German periodical published by him at Christiania in 1844-50. More recently, Professor Th. Kjerulf, in the Programme of Christiania University for 1870, has published a geological map of Southern Norway, illustrative of a paper on the glacial epoch, whilst to Professor K. Petterson we are indebted for a geological map of Tromsö, to be found in vol. vii. of the *Transactions of the Norwegian Society of Science*.

Our notice of Norwegian cartography could not be considered complete, nor should we have done justice to the *Topografiske Opmaaling*, if we passed by without remark the many beautiful charts published by it. Amongst the names most widely known in connection with Norwegian coast surveys, those of A. Viebe and Schie, the authors of the *Sailing Directions*, are the most prominent. The surveys made by these officers and by their colleagues of the Norwegian Navy, have become widely known through the reproductions issued by the English and French Hydrographic Offices. But these Norwegian officers, not any more than the naval surveyors of other nations, are content to rest upon their well-earned laurels, and new charts, more accurate and detailed than those published previously, are gradually supplanting the older ones. Amongst the more recent publications of this kind there are some charts prepared with special reference to the wants of fishermen, whose avocation plays so important a part in the national economy of Norway. In 1866 the "Storthing" wisely resolved that 1010*l.* a year should be expended upon the survey of the fishing banks lining the coast of Norway, and to the existence of which the country is indebted for so much of its wealth. The surveys carried on since that year are based upon careful triangulations, and the charts resulting from them are amongst the most successful specimens of hydrographic delineation issued. One of them represents the Vest Fiord with the Lofoten Islands,§ the other the coast from the Stadt promontory to Harö, including the Aalesund.‖ Both are on a scale of 1 : 100,000, contain numerous soundings and fathom-lines, and indicate the nature of the ground by means of symbols and tints. Amongst other recent charts, all of which are distinguished by clearness and superior workmanship, we may mention as representative a chart of Christiania Harbour (1 : 20,000), a chart of Christiania Fiord (1 : 50,000), a chart of the Sogne Fiord (1 : 100,000), and a general chart of the coast from Faerder to Utsire (1 : 350,000, 2 sheets).

* Geograf. Opmaaling: Rejsekart over Norge's 5 sydlige Stifter. 1:800,000. 2 sheets, Kristiania, 1869. 2nd. ed., 1870.

† P. A. Munch, Veikart over Norge. Kristiania, 1868. 5s. 6d.

‡ J. Waligorski and N. Wergeland:— Veikart over Norge. 2 sheets. Kristiania, 1st. ed., 1849, others published since.

§ Geogr. Opmaaling: Fiskekart over den indre del af vestfjorden i Lofoten. 1:100,000. 4 sheets. Kristiania, 1869.

‖ Geogr. Opmaaling: Kart over Havbankerne langs den Norske kyst fra Stadt til Harö. 4 sheets. 1:100,000. Kristiania, 1870.

A New Map of Venezuela.

THROUGH the kindness of a friend we have been permitted to inspect a manuscript map of Venezuela, drawn by the Marshal of Trinidad, Mr. Frederick Ralph Hart, F.R.G.S., &c., on a scale of 1 : 1,500,000. The author has embodied in this map much information collected on the spot, and especially during a survey which he made for the purpose of connecting his native Trinidad with Bogota, the capital of Columbia. We trust Mr. Hart may be induced to publish an account of these explorations in a region first rendered famous by the labours of Humboldt. His account of the Orinoco, Apure, and other rivers, which he examined specially with a view to their navigation, would no doubt furnish matter of interest alike to geographers and men of business.

E. G. RAVENSTEIN, F.R.G.S.

New Maps.

EUROPE.

Garnier (A.) Carte Routière du dep. des Vosges, dressée sous le controle dé l'ingenieur en chef du département. Paris, 1874.

Dumas (E.) Carte Géologique du Département du Garde, arrondisement d'Alais. Paris, 1874.

Sallanches et Chamounix. Paris (Dépôt de la Guerre), 1874.

Mongy et Gérard. Plan de la Ville de Lille agrandie. Paris, 1874. 1 sheet.

———. Plan de la Ville de Lille agrandie, de la banlieue et des communes limithrophes. 4 sheets. Paris, 1874.

Messtischblaetter vom Preussischen Staat. (Plane table sections of Prussia, 1 : 25,000). Sections 38 to 40, 50, 51, 52, 53, 54, 55, 56, 67, 68, 69, 70, 71, 72, 82, 83, 97, 98, 112, 113, 114, 115, 116, 117, 127, 128, 129, 130, 131. Berlin, 1874. 1s. each.

Straube (J.) Neuester Plan von Berlin mit nächster Umgebung, Plan of Berlin and environs. Imp. fol. Berlin, 1874. 1s.

Straube (J.) Neuester Plan der Kaiserstadt Berlin. Imp. fol. 1874. 1 : 17,777. Fol. Berlin, 1874. 3s.

Straube (J.) Postkarte von Berlin. (Postal Map of Berlin.) Imp. folio. Berlin, 1874. 6d.

Simencourt, Nuevo Mapa especial de los Caminos de los reynos de Espana y de Portugal. Paris, 1874.

Ilyin (A.) Map of the Railways, Post-routes, Telegraphs and Steamboat tracks of the Russian Empire, 1 : 1,200,000, with map of Asiatic Russia in margin. 2 sheets. St. Petersburg, 1874. 6s. (In Russian).

Ilyin (A.) Orographical Map of Russia in Europe. 1 : 7,350,000. St. Petersburg, 1874. (In Russian).

ASIA.

Tracé d'une excursion dans le Tonquin, par Dufour (Dépôt de la Marine). Paris, 1874.

AMERICA.

Carte de Guadeloupe et Dépendances, par Wuhrer (d'après E. Devèze). Paris, 1874.

Erhard: Great Northern Railways of Columbia. Map showing proposed railways in the States of Cundina, Marca, Boyaca, and Santander. Paris, 1874.

Log Book.

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"My Parentage and Early Career as a Slave."—The article in our last number with this heading, was entirely written by Selim Agha, formerly a slave, and is the record of his own adventures, which his subsequent education and his natural ability have enabled him to give in this interesting form. We mention this fact, as the *Queen*, in noticing the article, expressed an opinion that it was "manifestly the work of a cultivated European."

Recognition of Mr. Leigh Smith's Services.—We rejoice to hear that this persevering Arctic voyager, who in his voyage of 1873 did such good service in furnishing succour to the Swedish expedition, has had the Order of the Pole Star conferred upon him by His Majesty King Oscar II.

Count Wilczek's Approaching Arctic Trip.—Count Wilczek, the Austrian traveller, is preparing for a second Arctic voyage during the season, to Novaya Zemlya. He is not without hope of discovering some traces of the Austro-Hungarian Expedition of 1872; and with the idea of replenishing their failing stock of provisions, he is having constructed a number of small balloons which will be launched in every likely direction which the good ship 'Tegethoff' may have taken.

Exploration in Iceland.—The exploration of the European Alps does not any longer content the more ambitious members of the Alpine Club, and they are directing their attention to "pastures new." At the last meeting of the Club, which was held on the 5th of May, Mr. W. L. Watts explained his project of exploring the vast volcanic and glacier region of the Vatna Jökull, which occupies an area of 3800 square miles, and rises to a height of more than 6000 feet. Mr. Watts has already spent some time on this Jökull in 1871, when he was accompanied by his friend Mr. John Milne. He proposes now to start with a party of six or eight, and hopes to be able to accomplish his task in the course of three months, and at an expense not exceeding 50*l.* a head. There is no doubt that an expedition such as this would yield results interesting to geographers, and particularly to geologists, for although several attempts have been made to penetrate into this region, no one has succeeded hitherto in reaching the seat of present volcanic activity or of climbing the summit of any of the more prominent hills. Mr. Watts intends to start on the 31st of May, and we wish him success with all our heart.

European Measurement of a Degree.—The surveys in connection with the measurement of a degree have been resumed, in the beginning of May, under the direction of Colonel Ganhal of the Austrian, and General de Vecchi of the Italian Engineers, who are now measuring a base-line in the neighbourhood of Udine, as recommended at the meeting of the Permanent Commission held at Vienna in September last.

Organization of Russian Turkistan.—The administration, or rather mal-administration of Russian Turkistan has been the cause of much anxiety to the Russian Government The governor-general hitherto received a fixed sum annually from the Imperial treasury, which he expended according to his own discretion. He appointed and dismissed officials, and even enjoyed the right of decorating his subordinates. So great and unrestrained were his powers that the title of Polpadishah, conferred upon him by the inhabitants, would appear to be fully deserved. The district governors (Uyest Nachalniks) who served under him, were military men, unacquainted with the language and the customs of the people whom they were to govern, and more intent upon pleasure than duty. General Kaufmann, who is not personally charged with any arbitrary conduct, though he is certainly to blame for not having kept his subordinates under greater restraint, was the first to propose a reform. At his suggestion a commission, presided over by General A. Nenokoichitzky, met at St. Petersburg in the autumn of 1873 for the purpose of elaborating a project for the future government of the Central Asiatic provinces. The report of this commission has now been published. Turkistan will consist in future of the territories or governments of Semirechensk, Syr Daria, and Samarkand; the latter including the districts of Samarkand, Khojend, Kattykurgan, and Penjakend, and the district of Amu Daria, including the Kizil-Kum steppe. A governor-general will be placed at the head of the entire province; the territories will be under a military governor and a civilian vice-governor, and each district under a military district chief (Uyesti Nachalnik). On the staff of each vice-governor there will be a medical inspector, an engineer, an architect, a forester, a mining engineer, and a surveyor. Police boards will be instituted at Samarkand, Tashkend, and Vernoe, and commissioners of police appointed to the other towns. The organization is of a thoroughly military character, and the governor-general will in future be the subordinate of the Minister for War, who will likewise appoint all superior officers and officials. The powers of the governor-general have also been curtailed in some other respects, so as to render them somewhat analogous to those enjoyed by the same class of officials in other parts of the empire. He will, however, retain the privilege of conducting the diplomatic intercourse with the neighbouring states of Asia, of concluding postal contracts, &c. The entire expense of this administrative machinery is estimated at 28,000*l.* a year, exclusive of the cost of the police, the postal service, the collection of revenue, the making of roads, the administration of justice, and of other branches of administration. The governor-general is to enjoy an allowance of 1200*l.*, in addition to his salary; military governors are to have 600*l.* to 720*l.*, civilian vice-governors 180*l.*, and senior officials 100*l.* a year.

The project has been submitted to the Council of the Empire, but does not appear to have met with the favourable reception which its originator anticipated, for it has been referred, in the beginning of May, to the various ministers of State, and the governors of other outlying provinces, and it is anticipated that their reports upon it will turn out adversely. Under these circumstances, General Kaufmann is expected to resign the command which he has held for so many years. For the present, he has been granted three months' leave of absence.

We may mention in connection with this subject

that the Turkmen, ever since the punishment inflicted upon them by Colonel Ivanof in January last, pay their tribute regularly to the Khan of Khiva, and that that potentate is seriously contemplating to deprive them of the privileges which they enjoyed hitherto above the rest of his subjects.

The Amu Daria Expedition left St. Petersburg for Kazala on the lower Syr Daria on the 5th of May. It is the object of this expedition thoroughly to explore the delta of the Amu Daria, and to ascertain to what extent that river is navigable. For that purpose a steamer of small draught will be placed at the disposal of some of the party, and they will ascend as far as may appear practicable. Colonel Stoletof, who was stationed for some time at Krasnovodsk, and is well experienced in steppe-travelling, will take the command, whilst Severtsof, the well-known explorer of the Thian-Shan, I. Bogdanof, a naturalist who visited Khiva last year, and Major Herbert Wood, of the Royal Engineers, will be amongst the members of his staff. The Grand Duke Nicholas Constantinovich, who was originally intended to take charge of the expedition, has therefore been superseded, it is said, by the St. Petersburg correspondent of the *Allgemeine Zeitung*, because he appropriated some of his mother's diamonds to maintain an extravagant "little French milliner."

Official History of Khiva.—The official history of the Khivan campaign, published by order of the Emperor of Russia, will be compiled by Major-General Trotsky from the writings of the staff-officers and scientific men attached to the different columns. It will be divided into four parts, the first dealing with Russia's movements in Asia down to the year 1873, and giving, in addition, an account of the Khivan Khanate and the routes thither from a strategical point of view, a *resumé* of the causes which led to the expedition being determined on, the plan of the campaign, and an account of the various operations down to the fall of Khiva. The second part will deal with the occupation of the town up to the preparations for the departure of the Russian troops. The third part, besides relating the return of the forces, will contain a mass of valuable suggestions and information on the subject of steppe campaigns in general, while the fourth part will be entirely scientific, and reserved for a detailed account of the geographical, meteorological, zoological, botanical, geological, and other labours achieved by the various members of the expedition. The work will be illustrated by maps, route surveys, sketches, and detailed reports on special points of interest.

Asiatic Society of Japan.—The first part of the *Transactions* of this Society, which met for the first time at Yokohama on the 8th of October 1873, and already numbers 109 resident members, contains several papers interesting to geographers. To this class belong Mr. Satow's notes on the "Geography of Japan" and the "Loochoo Islands," Mr. W. G. Aston's account of Russian descents on Saghalien and Jtorup in 1806 and 1807, and Professor W. E. Griffis's paper on "The Streets and Street-names of Yedo."

Dr. Burmeister, who is favourably known on account of his contributions to the physical geography of the Argentina, has been appointed President of the Faculty of Natural Science at the University of Cordova.

Great discoveries of Guano on the Peruvian Coast.—A most important discovery has been made on the coast of Peru. The existence of a large deposit of guano, hitherto unknown, is confirmed. It lies principally on the point called Pabellon de Pica, ten miles north of the river Loa, which forms the boundary between Peru and Bolivia. Here the engineers, sent down by the Peruvian Government, have found 5,000,000 cubic metres of guano, which could be shipped by the construction of a tramway not more than 1300 yards in length. The anchorage is excellent. At Huanillas and Punta de Lobos, further to the north, 3,000,000 more cubic metres were found. Captain Cookson, of H.M.S. 'Petrel', has also gone carefully over the ground at Pabellon de Pica, and fully confirms the report of the engineers. Another commission is about to be sent to make a final survey. These 8,000,000 cubic metres of guano represent a sum equal to 52,000,000*l.*, which fare xceeds the amount of the public debt of Peru.

Exploration of the Aleutian Islands.—Since M. Pinart's* travels in the Aleutians, Mr. W. H. Dall, of the United States Survey, has been spending six months in exploring the islands. A new fore-and-aft schooner named 'Yukon,' of about 100 tons register, was placed at his disposal by the superintendent of the Coast Survey, and in this vessel he visited most of the principal islands, observed for latitude and magnetic declination, took the height of the chief peaks, and carried a series of deep-sea soundings northwards of the Aleutians. These last brought to light a new fact, *i. e.* that the shallow basin of Behring's Sea, by the north-west point of Oonalaska, dips suddenly down from a depth of 60 fathoms to 800 fathoms, while further to the north-west the bottom slopes down to 1100 fathoms. The theory of a current flowing round Behring's Sea in a circular direction has no foundation, according to Mr. Dall. Between Unimak and Bogoslof Islands he found 800 fathoms average depth, a fact which M. Pinart bears out by his description of the tremendous sea and continuous southerly current here prevalent.

Mr. Dall has also paid attention to natural history, and finds no blending of the American and Asiatic types, but in every respect a gradual approximation to the Arctic ones. The *fauna* of Attu, for instance, is purely Arctic. The sea temperature, too, is colder to the east than to the west of the Aleutians, which fact indicates a southerly current from Behring's Strait.

Mr. Dall intends to start again for these islands, from San Francisco, some time this spring, and to return at the latest about the spring of next year.

A Roman Catholic Mission on the Loango Coast.—In September 1872, a Roman Catholic Mission was founded at Landana, about 45 miles north of the mouth of the Congo, by Père Duparquet. The site was exceedingly pretty, the climate healthy, and several European factories have sprung up there, while palms, maize, and cassava have been largely planted and thrive most satisfactorily. The parasitical insects which infest so many parts of the African coasts are happily unknown, and the negroes being free from ailments common in other parts of the continent, are of good stature, active, intelligent, and make capital workmen.

* *Ocean Highways*, March, 1874, p. 520.

For the modest sum of 32*l.* Père Duparquet has purchased the freehold of a small valley about a kilometer square. There are several springs in it, and the mountain slopes are covered with rich pasturages and luxurious forests. Here he has started a school of agriculture, somewhat similar to those situated at the Gaboon, at Senegal, and at Zanzibar, and in October last was honoured with no less than sixteen pupils, nearly all sons of native chiefs! Communications with Europe are regular; and as there is a river hard by which admits of easy communication with the interior, there is good ground for anticipating a prosperous and speedy development of this young colony.

An Italian "Lloyd's."—Our readers are well aware of the increased importance which Brindisi, and more indirectly, the whole of Italy have derived from the opening of the Suez Canal. In February 1872, a committee was formed in Milan with the object of founding an Italian Maritime Company, and 20,000 francs were subscribed towards preliminary expenses. Camperio, Orlando, and other well-known names were associated with the project, and a congress at Rome was fixed upon, but, unfortunately, the matter has made no further progress. Italians do not seem to realise that they should abandon their position as mere brokers and navigators within the limits of the Mediterranean, and traverse the ocean, and thus take a share in the commerce of the world. For instance, to China, which, in 1871, was visited at its fourteen treaty-ports by no less than 11,124 ships bearing the British and American flags, there did not sail a single Italian merchantman! Italy with its 3350 miles of seaboard, its 18,000 vessels, and a marine of about 100,000 men, has exceptionally favourable opportunities for organizing a prosperous foreign trade.

The Milan Committee has published a *brochure* entitled *Messaggerie Marittima Italiane. Proposta d'una Società di Navigazione generale a vapore*, in which the above arguments are ably brought forward and forcibly urged. They also draw special attention to four trade-routes which offer exceptional commercial advantages, viz., those to the East Indies, China and Japan, to Turkey and Greece, to New York, and lastly to La Plata. The capital required is 50,000,000 francs. It is greatly to be hoped that, though the Government unfortunately is in no position to offer a helping hand, there may be sufficient private enterprise in Italy to bring to maturity so excellent and all-important an undertaking.

Piracy on the Coasts of Darien and Chocó.—It is reported, in the *Panama Star*, that a party of lawless men have been cruising for some time back in a small schooner along the unfrequented parts of the Coasts of Darien and Chocó, South of Port Pina. While an American by the name of Newcomb was repairing his vessel on the beach of a little bay, into which the river Coredo falls, some 10 or 12 miles to the north of point Marzo, this said schooner came in and anchored. Shortly after, a party of six or eight men, armed with rifles, came to where Mr. Newcomb was, and demanded his money or his life. He gave up to them $500, which they took, and ordered him as soon as his vessel floated to clear out and leave the bay. Mr. Newcomb did so, and returned to Port Pinas, where he has a house, and is engaged in the Caucho trade. There happened to be anchored not far from him in the bay of Coredo another vessel, belonging to a man in Panama, by name P. Blanco, who was also robbed by the same party of $650. Sworn depositions by witnesses of these acts of piracy have just been taken before the United States Consul in Panama. Both Newcomb and Blanco believe this piratical expedition was fitted out in Buenaventura, a port on the coast of New Granada.

Obituary.—Professor PHILLIPS died on the 25th of April from the effects of a fall down the stairs of All Souls' College, Oxford, aged 73 years and 4 months. Ever since 1826 he has been one of the most indefatigable contributors to the literature of geology, his latest works being a *History of Vesuvius*, and a *Treatise on the Geology of the Thames Valley*. He was the inventor of a pluviameter, of a self-discharging electrophorus, and of a peculiar maximum thermometer; and with General Sabine and others took part in a magnetical survey of the British Isles.

We purpose giving in our next number a memoir of this eminent scientific man.

Dr. BERGSTRAESSER, Russian Councillor of State, died on 19th of last April, at Tamar. He had done much to develop the exploration of the naphtha springs in the Caucasian provinces, but is best known to geographers in connection with the proposed canal between the Black Sea and the Caspian. The deceased was a member of the commission appointed to carry out the liberation of the serfs, and the author of several works on political economy.

Dr. RICHARD BRENNER, late Austrian Consul at Zanzibar, died at that place on the 22nd of March, from acute disease of the lungs, leaving a young widow and an only child to deplore his loss. Dr. Brenner was a native of Merseburg. He accompanied Baron von der Decken during a portion of his East African wanderings, and was one of the few survivors who escaped the Baron's fate on the Juba. Subsequently the deceased visited the coasts of Arabia, the Gulf of Persia, and Eastern Africa, and penetrated, in 1866-67, for some distance into the Somal and Galla countries. A copy of James Wainwright's diary was given to Dr. Brenner ten days before he died, and has been forwarded to Dr. Petermann for publication in the geographical *Mittheilungen*.

Baron HEINRICH VON MALTZAN died on the 22nd of February at Pisa, at the early age of 48. He enjoyed a high reputation as a traveller and Orientalist. Amongst the works published by him are—*Three Years in North-Western Africa*, *A Pilgrimage to Mekka*, *Travels in Tunis and Tripoli*, and others. We are likewise indebted to him for the publication of Wrede's most valuable diary, kept during a journey into Hadramaut, and for a work on South-Western Arabia, which is crammed full with geographical facts. The deceased was a frequent contributor to *Petermann's Mittheilungen*, to the *Journal of the German Oriental Society*, and the *Allgemeine Zeitung*.

The Rev. FRANCIS MASON, D.D., born at York, in 1799, and for many years a Missionary of the Unitarian Baptist Society, died lately, after returning from Bhamo, in Upper Burma, aged 75. He was the author of a Karen grammar, and of a work on Tenasserim, published in 1852. At the time of his death he was occupied upon a *Handbook for Burma*.

Correspondence.

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To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In the *Geographical Magazine* for May (which has reached me late) there is a report of an interesting paper by Mr. Ashton Dilke on the Valley of the Ili. In speaking of the lake called Issik Kul, and certain theories about it, he says this lake "as we know from Chinese records, was formed by some convulsion of nature about 150 years back." I should have supposed 150 to be a misprint, but a friend who was present at the Society's meeting, gave me the same account. Now Abulgházi, historian and king, says that Turk, the son of Japhet, dwelt on the banks of Issik Kul, which carries us a good bit further back than 150 years, and if not back to Japhet, at least as far back as Abulgházi himself, who died 211 years ago. Moreover, on the famous Catalan Map in the great French Library, dating from 1375 or thereabouts, we find very fairly located lake Yssikol, with a rubric stating that there was an Armenian convent theron, which contained the body of St. Matthew. Here again we need not swear to the body of the Apostle, but we may (if need be) that lake Issik Kul existed more than 500 years ago. Furthermore, the Chinese Pilgrim Hwen T'sang, in A.D. 629, travelling N.W. from Polukia or Aksu, crosses "an Ice-mountain" in connection with the Tsung-ling (viz., the *Múz-tágh*), and descends upon a great lake which he calls T'sing-chi. This lake was about 1000 *li**—say 200 miles—in circuit; was long from E. to W., and narrow from N. to S.; was surrounded on all sides by mountains; had salt and bitter water; abounded in fish; and also contained dragons, &c., &c. We need not perhaps believe in the dragons, but we must believe that the lake, which can only be Issik Kul, existed 1245 years ago. I cannot *prove* its existence any further back.—Your's very faithfully,

H. YULE, *Colonel.*

PALERMO, *May 16th*, 1874.

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M. KHANIKOFF ON FRASER'S TRAVELS IN KHORASÁN.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Some eighteen months since you were good enough to give me space in *Ocean Highways* for following Colonel Yule in the exposure of errors and misstatements into which the illustrious Russian traveller M. Khanikoff has been led by unworthy jealousy of his English predecessors in the field of Central Asian Travel.

Study of every work bearing on the geography of Persia in the course of preparing a map of that country for the India Office, has brought to my knowledge another instance of M. Khanikoff's want of candour, to use no harsher expression, in criticising the work of an Englishman, which will be blamed by all who hold that "science has no country." You will not, I feel sure, grudge me a few lines to place before English geographers the admirable results obtained by a fellow countryman with the slenderest means, and to exhibit in their true light scientific achievements slurred over or damned with faint praise by a successor in the same path, in order to exalt the performances of himself and another Russian explorer, M. Lemm.

M. Khanikoff devotes the first part of his work *Sur la partie meridionale de l'Asie Centrale*, to an account of earlier travellers in Eastern Persia. Pages 28 to 32 contain an account of the journeys of Fraser in 1821-22. After describing Fraser's route in general terms, and mentioning the instruments he took with him, he says, "Il mit beaucoup d'assiduité à faire des observations astronomiques, mais comme il ne les a jamais publiés en detail, nous ne pouvons les juger que par les resultats qu'il a donnés." What more does M. Khanikoff want? Surely he must know that details are no proof of good faith, and that it is as easy to calculate the altitude of a heavenly body from a given place and time, as to find the latitude or longitude from the altitude. To Englishmen it would seem that elaborate volumes of mere logarithmic calculations, such as are published by the Russian Government, are but a vulgar parade of scientific accuracy, or, at best, useful only as examples in works of practical astronomy. Be this as it may, Fraser was first in the field as a determiner of longitudes in Eastern Persia, and his results are therefore sufficient to judge him by.

After giving the number of points fixed by Fraser, and the methods he adopted, M. Khanikoff points out discrepancies in the results obtained in two places, Damghán and Níshapúr, by his chronometric and lunar observations, and those of Jupiter's satellites, in the following terms. "La difference de 46 minutes pour le premier point et de 10 minutes pour le second ne donne pas une très haute idée de l'exactitude des observations elles mêmes (the eclipse and chronometric longitudes of Níshapúr are but 1′ 37″ apart, and their accuracy is confirmed by Lemm), et dans tous les cas cette discordance justifie la prudence avec laquelle M. Arrowsmith a modifié plus on moins les co-ordonnés geographiques de quelques points determinés astronomiquement par M. Fraser, d'après l'indication des distances evalués par le voyageur, et les angles qu'il a mesurés à l'aide de la boussole." Not a word about the longitude of the three principal cities fixed by Fraser, Tehran, Meshed, and Isfahan. Indeed the whole passage would lead the reader to suppose that the instances given are fair examples of Fraser's work, that his astronomical observations are of no great value, and that much, if not most, of the merit of his map is due to Mr. Arrowsmith. I do not wish for a moment to depreciate the services of that eminent cartographer, but simply to render justice to Fraser, the measure of whose capabilities as an observer, can readily be seen from the following table of longitudes of the three places mentioned above:—

Longitudes.	By telegraph.	Fraser.	Lemm.	Khanikoff.
Tehran	51° 24′ 54″	51° 22′ 30″	51° 27′ 24″	follows Lemm
Isfahan	51° 39′	51° 42′ 30″	...	51° 45′ 45″
Meshed	...	59° 35′ 27″	59° 38′ 45″	59° 37′

A glance at this will show that Fraser, with his imperfect instruments, and the powers of observation of which M. Khanikoff has not a "haute idée," fixed the longitude of Teheran as near the truth as Lemm, the pupil of the great Struve, to whose really admirable work several pages are devoted by M. Khanikoff; and that he got nearer the longitude of Isfahan by 3 miles than M. Khanikoff himself, with a trained staff and all the appliances he considers so necessary. At Meshed the two Russians did nothing more than confirm the great accuracy of the result obtained by the Englishmen. To omit all mention of this remarkable achievement was neither just nor generous, and I cannot but believe that Englishmen chronicling the scientific results of their expedition, following, after many years, the track of a solitary Russian traveller, would not have been eager to award to their predecessor a full measure of praise wherever his observations were corroborated by their own, instead of passing them over in silence, and to fix on minor and comparatively unimportant points of discrepancy for the purpose of withdrawing attention from the foreigner's work to their own.—Yours, &c.,

O. ST. JOHN.

* So in the *Mémoires sur les Contrées Occidentales*, I., p. 11; in the *Vie et Voyages de H. T.*, p. 54, the circuit is 1400 or 1500 *li*.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

May 10th, 1874.

THE Right Hon. Sir H. BARTLE FRERE, K.C.B., took the chair at 8.30 P.M. Among those present were the Duke of Sutherland, Sir Garnet Wolseley, Sir John Glover, Sir Francis Festing, Captain Sartorius, Captain A. H. Hoskins, R.N., Captain Fremantle, R.N., Captain A. H. Markham, R.N., Colonel Fairfax, Major Wilson, R.E., Captain Home, R.A., &c.

The PRESIDENT said he had hoped before this to have been able to lay before them some details of the Australian explorations of Colonel Egerton Warburton, but beyond the bare fact that he and the members of his party had arrived in safety at the end of their journey, there was as yet little to communicate. He would now call upon Captain Sir John Glover to give the results of some of his explorations upon the Gold Coast, with which he was so well acquainted.

Sir JOHN GLOVER then gave an account of his expedition from the Volta to Coomassie. He said that their first and most persistent enemies, on arriving at Accra, were the slave-masters. After the expedition had crossed the Prah, instead of assisting the troops by their slaves to fight their battle, they immediately proceeded to put all their slaves in chains to prevent their joining the Queen's forces. He described the country after leaving Adoomassy as covered with forests. Three ranges of mountains had to be crossed, but the great difficulty in following the narrow path was to keep from falling down the gold pits which were dug on either side of the road. The natives had only an idea of sinking a shaft, and never tunnelled underneath. He believed that with scientific appliances a great quantity of gold could be still found there. The mountains were entirely composed of quartz and granite, while the rivers over which they passed were all dammed up for the purpose of washing gold. Ten miles inland from Accra, the mountains of Acropong attained an altitude of 1600 feet, and from there, until they reached the river Amoor, the line of march was over a country marked by the gold shafts he had described. He described the natives as a very idle race; so idle that he did not think they would interfere with any one enterprising enough to go out and dig the gold on their own farms. The Beren River was said to be very rich in gold. After the floods large boulders were washed down, and being split open by the force of the current, the natives went down when the river was low and secured very large quantities of the precious metal. He remarked on the entire absence of animal life in those regions: they met with neither antelope nor leopard, and no birds except a few parrots, which sometimes screamed from the tops of the trees. The only living beings with which they were troubled were ants and snakes. After taking Abogoo they succeeded in surprising and capturing some 200 sheep. When the country was opened up to commerce by the recent victory, he was sure that a large amount of territory between the Upper Volta, Timbuctoo and the Niger would be brought within the sphere of civilization. The entire country east of Coomassie to the Volta had given in its adhesion to the British Government, and refused allegiance to the King of Ashanti. Therefore, whatever might be the King's objection to keeping the treaty, his power was gone, and the results to civilization would be manifest. The country running up towards the Niger was large, open prairie land, with clumps of trees and tall grass. It was a country in which all kinds of animals live: a bullock at Saga cost 4*s*. 6*d*., a sheep 6*d*., and fowls about 1*d*. each. It was inhabited by Muhammadan tribes whose great power was in their cavalry, and no doubt now that the power of King Coffee was broken, these enterprising men would press down to the sea-coast to taste the sweets of what they called the white man's trade. He was almost afraid to tell the company present, which included so many ladies, that he had been compelled to be so ungallant as to press the women of the country into the service as carriers; but were he to go out again he should certainly recommend the Government to raise a force of women and arm them, and leave the men at home. After speaking in high terms of the work done by the German missionaries at Accra and the inland towns, Sir John Glover expressed his willingness to answer any inquiries that might be made of him to the best of his ability with regard to the nature and resources of that country.

Sir GARNET WOLSELEY having been called upon to speak, confirmed the account given by Captain Glover. The principal food of the inhabitants was a large species of snail, which was toasted. He saw neither fowl nor sheep in the district through which he passed. He described the march to Coomassie as being under a tunnel of trees, and though at first the foliage seemed very beautiful and the trees very grand, it soon palled upon the eye. He believed the effect of the expedition would be to open the country to commerce and civilization. When he arrived at the coast, the name of England was at the lowest in that part of Africa, but he believed nothing could stand higher now, and that the prestige of England's name would make the work of exploring the interior easy for a long time to come. He saw no gold mines, but the old women at Cape Coast Castle were in the habit of washing for gold in the gutters in the streets after a shower of rain. As they seemed to have been engaged in that employment from time immemorial, he supposed they were able to obtain a sufficient amount of gold to support them for the day. As to their religion it was difficult to say what it was, for they seemed to worship sticks or stones, or anything which took their fancy, even if it was a pair of old boots. They had an idea of some kind of deity, but it was a bad deity rather than a good one. There appeared to be some connection between Western and Eastern Africa, for the Accra bead found in the neighbourhood of Lake Chad, was evidently of Egyptian construction. He said that if the result of the expedition was the abolition of human sacrifices, it would not have been undertaken in vain. He believed the only way of stopping the internal slave trade would be the entire prohibition of the importation of arms and ammunition to the West Coast of Africa.

Captain FREMANTLE then gave his impressions of the Fanti and Ashanti country. He endorsed what had been said as to the entire absence of animal life, which his experience taught him was, like human life, extremely scarce where the bush was thick. The trade of the country consisted in the importation of arms, ammunition, rum, tobacco, and cloth, in exchange for which gold dust was given. The Ashanti was entirely non-productive; the Fanti was somewhat better, and he believed that if the Ashantis were subdued the first step in their advance would be to make them Fantis. Their language was the same, though the dialect might be slightly different. With regard to the alleged greater cowardice of the Fantis than of the Ashantis, he said they had not been behind the scenes with the one as they had with the other.

The Rev. W. HUTCHINSON having expressed the pleasure with which he heard the German mission at Accra so highly spoken of,

The CHAIRMAN expressed the thanks of the Society to the officers who had favoured the Society with their presence on that occasion.

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AMERICAN GEOGRAPHICAL SOCIETY.

LETTERS FROM THE OFFICERS OF THE 'POLARIS.'

I.

From Captain Buddington.

GROTON, *February 20th*, 1874.

As there has been a great deal said about the voyage of the 'Polaris,' I consider it my duty to make a straightforward statement. Not wishing to build myself up by tearing some one else down (as is too often the case), every statement I make here I will prove by the majority and best of the officers and crew. And I wish to state here I never sailed with better officers and crew, during twenty-one years as master of a ship; I refer to mate, second mate, engineers, seamen, firemen, cook, and steward. After leaving Upernavik, we passed Melvin's Bay, Smith's Sound, and Kennedy Channel, with little or no obstruction from ice. After passing through Kennedy Channel we went into what we called Hall's Basin; we passed through that and came into a channel which Captain Hall named Robeson's Channel; proceeded up to lat. 82° 16′ where we met with heavy ice, all old heavy floes. Captain Hall designated them century floes. This strait was running true N.N.E.; we had 104° westerly variation, at 4 o'clock, a.m., August 29th, 1871. We came to a full stop at this barrier making from one shore to the other; these straits were about 15 miles wide. The weather being cloudy, could get no observation; the ice in the middle of the straits was setting south, about 2 miles an hour. As there was no chance of getting farther north, Captain Hall told me to go on the east side of the straits and look for a harbour. When within about a mile of the shore we found the tide running very strong to the southward; the heavy floes going along the shore at the rate of about 4 miles an hour. Captain Hall and Captain Tyson endeavoured to land twice, but owing to the strong tide and heavy ice, found it impossible to do so. As it was impossible to proceed farther north, Captain Hall held a consultation with the officers and scientific gentlemen; the result I will give you in their own words:—Dr. Bessels was the first consulted; his opinion was, if we could get no farther north, to cross the straits and winter on the west side, as the east side was better for navigation; the west was better for sledge journeys. Mr. Myers was then consulted and coincided with Dr. Bessel; Mr. Morton's opinion was the same, or nearly so; Captain Tyson's, to get into a harbour as soon as possible; Mr. Chester's, to get as far north as possible, as every mile we got north with the ship would save so much sledging. I was then asked my opinion. I said it was best to go into Newman's Bay, which was 5 or 6 miles south of us, and hold on until there was an opening for us to the north, as the ice was setting south and we were losing ground every minute; but Captain Hall decided to try and cross the straits to the west, if possible; if not, to return into Newman's Bay. In trying to cross the straits we got beset among the heavy floes and drifted 50 miles to the south. We got one very heavy nip, and landed a part of our provisions and stores on the ice. The ice slacked up, and we finally got clear the afternoon of September 4th, and worked in-shore on the east side of Hall's Basin, where we came to anchor between the shore and a large grounded berg in what is now called Polaris Bay, in 10 fathoms of water. The next day, Captain Hall went on top of a mountain to take a look at Robeson's Channel. When he came back he told me to land the provisions and prepare for winter, as he had decided it would be impossible to proceed further that year. On the 10th of October, he made a sledge journey to Newman's Bay. Robeson's Channel was still blocked with ice, moving south, which I think was convincing proof that there was no water near us to the north. If there had been, we being anchored, the ice would have passed us, and we should have soon been in open water. As long as we had light the ice was moving south in the channel, and as soon as we had light in the spring, it was still moving the same. On the 24th of October, in the afternoon, Captain Hall returned to the ship from his sledge journey to Newman's Bay, and spoke very highly of it as a winter harbour, and wished we had been there. He was taken sick the same afternoon, and died on the 8th of November, and was buried on the 10th. Every man (especially seamen) knows what it is to lose a commander on the beginning of a long voyage: the subordinate who is so unfortunate as to try to fill his position has a great many obstacles to surmount, especially where so many are on an equality as on board the 'Polaris.' It matters but little what his qualifications may be, he cannot command nor demand the respect that the commander has who sails in command from home. I found it impossible to keep up the same discipline, or the same kind of discipline that Captain Hall had. The duty of the ship was strictly attended to; the amusement of the men was somewhat different. They took a great interest in hunting and dog driving; and as I knew that pleasure combined with exercise was the only thing for health in that country, I indulged them in that luxury. I think it was owing to this we had not a sick man during the winter. A sailor with a gun or a horse is a very busy, but not a profitable man. In the spring of 1872 I used every means in my power with ship, boats, and sledges, to proceed north, but failed in every attempt, and finally, on the 12th of August, with the ship leaking badly, and our coal nearly exhausted, I made up my mind to return home. As to the accusations concerning Captain Hall's death, deserting the party on the ice intentionally, or habitual drunkenness, I think them too ridiculous to mention; as I consider a person who would be guilty of such things would surely deny them.—Very respectfully yours.

J. O. BUDDINGTON.

II.

From Captain Tyson.

SIR,—In compliance with your request that I should give you my views upon the hydrography of Smith's Sound and the waters connecting with it to the northward—and especially as to the correctness of some of the views advanced before the Geographical Society, on the occasion of its late "Reception to the officers and crew of the late 'Polaris' Expedition," I here briefly set down my ideas upon the subject. On the occasion referred to, Captain Buddington gave it as his opinion "that it was impossible to get through Robeson's Channel," adding that he "saw no signs of water to the northward." Now, Captain Buddington has seen ice before, but on this occasion seemed to have taken counsel of his fears, rather than a correct observation of the facts in the case. Then followed Mr. Bryan, the astronomer and chaplain to the expedition, who was just seven days old in the Arctic world when called into counsel by Captain Hall; and with all due respect to our young scientific friend, who thinks that "the ship was never built, or if built never manned, that could penetrate the ice" north of 82° 16′, it must be remembered that he was not appointed on the expedition as a Polar expert, but to take observations on the stars, and if possible to reach beyond, to the heavenly gates, in his *role* of chaplain; but even he did not say but that a dark water cloud could be distinctly seen, and apparently close to us, at our highest latitude north. But first, to settle the question as to the ice-pack in Smith's Sound. Captain Buddington declared that he "could see no water there," and was for turning back and putting into Port Foulk. The pack-ice on the 28th of August, 1871, was very heavy and compact, but there was water close under the west shore, and during my watch on deck, I rounded or flanked that pack, by sailing first to the S.S.W., and made the west shore at 2 o'clock A.M. rounding the western edge of the pack at 4 o'clock A.M. I then went below—the 'Polaris' had then been steaming direct up the land for two hours. At 6·30 A.M.

Captain Buddington sent the Steward (Heron) to call me. I went on deck. Captain Hall was then about half way to the shore in one of the boats—the vessel being abreast of Cape Frazer, and about half a mile from the shore. On coming on deck I asked Captain Buddington what Captain Hall was going on shore for. He replied "to look for a harbour; we cannot get any farther north, there is no water ahead;" but upon my plainly showing him his error, he said, "Well, we must not go any further, we have got too far now; if we go any further north we will never get back." Now if we had turned back at this point, Messrs. Buddington and Bryan would undoubtedly have said that the 'Polaris' had gone as far as it was possible to go, and that "the ship was never built, or if built never manned," that could have penetrated the ice of Smith's Sound! Captain Hall soon returned, very fortunately finding no harbour, and the vessel was again pointed northward, steaming through close and heavy floes off of, and to the north of Cape Frazer, coming in a few hours to comparatively clear water; and for 150 miles there was scarcely any ice to be seen, nor indeed until we came to Robeson's Channel. The snow had at that time entirely disappeared from the land, nor was there any shore-ice adhering to the coast; indeed, all that was needed to give the scenery the aspect of the temperate zone was a few trees. But here was a new channel—new at least to the knowledge of the civilized world—blocked with large, heavy floes. Robeson's Channel is about 18 or 20 miles wide, and I think from 30 to 35 miles through. Here we found the ice very close and heavy; it was also very much discoloured with earth and mixed with stones, which showed that these floes had been formed on the plateaux further north, and had drifted down to their present position during the summer, and had thus blocked up the channel. This obstruction, however, was merely temporary—all that was needed was a strong blow from the N. or N.E. to clear the blockade, by driving this ice to the southward, thus leaving this channel navigable. Captain Hall, finding it impossible just then to get the vessel through on the east side, called a consultation of officers. There were present Captain Buddington, Chester, Morton, Dr. Bessels, Myers, and myself. Buddington wished to return south to the bay, since known as Newman's, and there spend the winter. I told Captain Hall that he should try and find a safe harbour at once for the vessel, where he could, without risking the 'Polaris,' lie by and watch for the movement of the ice in Robeson's Channel, and where he might be able to take advantage of an opening; for I felt convinced that the first strong wind would clear the channel and give us the opportunity to get further north. But the majority were in favour of trying the west shore, wishing to see if the vessel could not be forced through on that side. So to the westward the 'Polaris' steamed; and in a few hours we were among the large heavy floes—and yet all this time there was the dark water cloud but a short distance to the north of us. Occasionally a damp, black fog would roll down upon the vessel, with the light N.E. wind which then prevailed. I also saw here a great deal of ice, which looked as if it had been washed by the sea; the vessel's head, too, rose and fell with the swell as we approached Robeson's Channel. But here we were, locked in among the floes, with water both to the north and south—Kane's "open Polar sea" to the south, and the unknown world and waters to the north, with but a few miles of ice lying between the 'Polaris' and the unsolved mysteries beyond. Soon the N.E. wind, which had been very moderate, increased to a gale, and, as I had anticipated, the ice in Robeson's Channel commenced moving southward at about 2 miles an hour, and away we went with it, until the ice reached the opening of Polaris Bay, when it broke and spread, and the vessel was free once more. Now then the vessel could have steamed through the channel—now was the time; delay was ruin, for the season was then drawing to its close; but winter was approaching, a few days remained yet in which we might have navigated those seas, and with steam have accomplished—we know not how much more. But instead of improving this opportunity, which Providence fairly thrust in our faces, we steamed for a little bay south of Cape Lupton, since called Thank God Harbour. There we found good anchorage in 11 fathoms of water having a mud bottom. We had, however, at this anchorage no other protection than such as the grounded hummocks afforded, and that was very little. It was about 3 o'clock A.M. on the 1st or 2nd of September when we made this harbour. About 8 o'clock A.M. Captain Hall held another consultation with Chester and myself, Captain Buddington standing by. As there was plenty of water our decision was to go northward again, but this decision was overruled—the sailing-master, Captain Buddington, declaring "she should not move from there." It would have taken the 'Polaris' but a few hours to have steamed entirely through Robeson's Channel, supposing the ice to have been cleared out as I have no doubt it was at that time. A few days after anchoring we had our first snow-storm, the snow falling amid the hummocks, lay for some days soft and plush-like, but gradually hardened so that we could walk upon it. But for many days, indeed, until we lost the light, there was plenty of water within a few hundred yards of the vessel. In the latter part of November, in a very heavy N.E. gale, our little 'Polaris' broke out of her winter quarters. We had no day-light then, so we could not see how much water surrounded us, but the vessel was in considerable motion, rising and falling several feet to the swell. North-east winds prevailed during the winter, often blowing with great violence; the gales continuing sometimes for five or six consecutive days. These N.E. gales would drive the ice all southward—then new ice would again form, only to be driven away by the next gale. In February, although the sun's disc had not appeared above the horizon, yet our light was quite good. At mid-day you could see as well as though the sun had been shining; and after one of those fierce north-east gales, I climbed to the top of Cape Lupton (about 1800 feet), and from that elevation I could see no ice; the gales had driven it all southward. To the north the horizon looked dark and watery. Even the ice along the shores had disappeared—none remained, except the ice grounded among the shoals running from Cape Lupton to the Southern Fiord. In March the ice became permanent; the north-east gales had no effect on it any more, until the month of May, when it was once more in motion, drifting first south, then north, crushing and grinding itself into its original element, water. There is great significance in the tides to those who can understand them. In strong southerly gales the tides were invariably higher than at any other time, and while the gale continued in this direction there would be but a very slight fall, while during the prevalence of north-east gales the tides did not rise near so high; and in the long, heavy gales from the north, very low tides were observed and very little rise. Mr. Bryan, as confirming his hypothesis of the impossibility of getting farther northward, said that "in the spring they made several attempts to get north with the vessel" (while I was up at Newman's Bay). This proves nothing, even if the attempts made had been genuine efforts, for the only proper time to navigate these waters is the last part of August. On the 30th of August, 1871, there was an opportunity to get north through Robeson's Channel. In June, 1872, Buddington made some feints to get north, but he had said plainly to me before, that he did not wish to go any further north, and these purposeless endeavours were meant simply to impress the inexperienced on board that he had done his whole duty. In fact, the 'Polaris' had been so badly handled through the winter, that she was not in a condition to continue her voyage with any prospect of success—providing the provisions and coal had been sufficient, which

they were not, on account of the great waste which had been permitted through the winter, after Captain Hall's death. In regard to the expedition of the two boats which started for the northward in June, 1872, they were too frail—only half-inch cedar planking—to contend with Arctic ice. The month of June, too, is one of the worst seasons for boat journeying in the far north, for then the broken ice is most plentiful—then, the Arctic seas, fiords, and bays are breaking up, and emptying themselves into the straits and channels; wind and current helping to force these floes and hummocks to the south. The attempts, therefore, to get the 'Polaris' northward at that time were simply folly—exploiting for the purpose above named. Of the two boat parties, all the men lived to return; but of the boats neither, one was lost almost as soon as launched, and the two others had to be abandoned 20 miles from the ship; the officers and crews walking back over land. You will ask—Why did not an exploring expedition go by land? Those who were willing to go could not get the authority or proper means to go with. There were excellent opportunities to accomplish something by land travel. We had plenty of good dogs, and two good Esquimaux drivers—one of them (Joe) even wanted to go, but beyond 31 miles north of where the ship lay, nothing was known—that distance Mr. Myers and myself travelled on a musk-ox hunt, up to latitude 82° 9′ N.; beyond that the foot of white man has never trodden.—Respectfully yours,

GEO. E. TYSON.

Late Assistant Navigator to 'Polaris' Expedition.

III.

From Captain Chester.

NOANK, *February 20th*, 1874.

SIR,—To comply with your wish, I write you a short and truthful narrative of the progress of the 'Polaris,' of the late North Pole Expedition, after leaving Tessuisak, the most northern settlement on Greenland. Leaving Tessuisak, on the afternoon of the 23rd of August, 1871, a dense fog prevailing, we steamed along to the north about half speed, feeling our way through the fog, passing occasionally near large icebergs. We were enveloped in a dense fog till meridian of the 24th. I mention this to show that there were twenty-four hours steaming a little better than half speed. On the clearing up of the fog thousands of icebergs were in sight. Looking to the north from our vessel, the icebergs were so numerous that they presented an impenetrable wall of ice, no opening to be seen through them; but as we advanced up, we wormed the 'Polaris' through between them till we came out to the north. At about seven o'clock in the afternoon of the 24th, we came up to pack-ice, but it was so open that we had no difficulty in steaming through it. A few hours' steaming cleared us of this ice, and we came out into a clear open sea of water beyond. Cape York was now in sight, and we were making the best of our way towards it. There was no ice to be seen to the north at this time. On the morning of the 25th we came up to pack-ice near Cape York, and were obliged to steam off to the west a number of miles, where the pack loosened; we again steaming to the north. At about six o'clock in the afternoon of this day we passed through between Wolstenholme and Saunders Island. We continued to encounter loose drifting ice up to about ten o'clock on the morning of the 26th, when we were in clear water again. Not a speck of ice to be seen to the north, with the exception of two or three small ice-bergs. We passed up through Smith's Straits, no pack-ice to be seen. About five o'clock in the afternoon of the 26th, we passed Littleton Island, the island near which, fourteen months later, the 'Polaris' was lost. When nearly abreast of Cairn Point, the course was shaped for Cape Frazer, on the west side of Smith's Sound. After entering Smith's Sound small patches of ice were seen here and there. At about midnight we came up to the pack, and were obliged to steer off, some to the west where the pack was looser; to the east and north the pack was heavy and close; to the west it was more open and navigable. We had no difficulty in steaming along, for the next morning, at seven o'clock, Captain Hall landed with the boat at Cape Frazer; his object was to examine a small bay to see if it was suitable for a winter harbour, should we be compelled to retreat south again by meeting with heavy ice. He soon returned to the ship, and we commenced steaming again to the north, passing through loose drifting ice till we reached Cape Wilkes. We there emerged into a sea of open water again, no ice to be seen to the north, of any description, either bergs or pack-ice. We steamed along, keeping near the west coast. In the evening a thick fog shut down, which obscured the land on both sides of the channel. We steamed along slowly, meeting no ice. At midnight passed near a small island; its peculiar shape attracted our attention, it being, on its southern side, a perpendicular bluff out of the sea to an elevation of about 300 feet, and then sloping down gradually to the sea on its northern side. We passed near this island in coming south with the 'Polaris' about a year later, and recognised it as being the one passed in the fog going up. There were, also, two other islands near this in Kennedy Channel, one large and one small one; the three extended nearly one-half of the distance across the channel. The channel here was about 18 miles in width. To resume my story: on the morning of the 28th, the fog clearing up, a beautiful sight met our gaze, the sun shone out bright; the land to the north, east and west entirely clear of snow, even in the deep ravines, where, in a much lower latitude, the snow remains the year round, was here almost entirely clear, and the land looked so pleasant and warm that we were anxious to make a landing upon it. On the clearing up of the fog this morning we found ourselves near the mouth of what is now known as the Southern Fiord, at Polaris Bay. Several altitudes of the sun were taken here by different observers. It remained clear about one hour. From our position at this time, looking towards the north, no channel or outlet could be seen in that direction; the Grinnell Land connecting with the Greenland side, some began to think we were in a bay. The fog soon shutting down, we were compelled to lay still here till noon, small patches of ice about. We attempted to make a sounding here, running out 270 fathoms of line, finding no bottom. At noon the fog cleared away again, sun out. Meridian altitudes of the sun were taken; then commenced to steam to the north again. Advancing up towards what is now known as Cape Lupton, we began to open a channel out to the north, which is now known as Robeson's Channel. Early in the afternoon thick snow set in. Steaming slowly through loose drifting ice, the snow compelled us to make fast to the ice occasionally, when it was too thick, and we would steam ahead again when the snow cleared a little. We noticed quite a strong current here setting down the channel to the south-west. The most of the ice here was loose drifting ice, and no difficulty in steaming through it. Clear weather was all we wanted here. The channel, as near as we could judge, at this time, looking up through it, was about 16 or 17 miles in width. We were bothered, more or less, with thick snow till the night of the 30th of August. When we were steaming up the channel through loose drifting ice on the morning of the 31st, passed what is now known as Newman's Bay. Several miles to the north of this, Captain Hall tried to effect a landing, but the small ice near the shore moving so rapidly with the current prevented him, and he was compelled to return to the vessel. Soon after his arrival on board, in steaming up through loose drift ice the vessel was stopped and turned round heading down the channel; the officers were called up, and a consultation held. The result of this consultation was a decision to cross the channel and try to work up the west shore. In crossing this channel we were beset, near the

middle, and began to drift south with the ice. It was my firm conviction at the time, and has been ever since, that if we had pushed ahead, keeping near the east shore, where we were, in a few hours we could have been out through Robeson's Channel into a large bay or sea beyond. While we were in Robeson's Channel a dark cloud was constantly seen to the north, having the appearance of a water cloud; this same dark cloud was seen by myself and Captain Hall forty-eight days later from the summit of Cape Brevoort, the North Cape of Newman's Bay. I sincerely believe that that cloud hung over a sea or space of open water. I cannot place any blame on Captain Hall for the ship not being pushed ahead. At the time she was first stopped in Robeson's Channel, he was unacquainted with ice navigation in a vessel, and, therefore, was obliged to listen to some one else. I had great confidence in the man before we left the United States, and that confidence was the same up to the day of his death. I am satisfied in my own mind, had his life been spared, the expedition would have been a complete success. There have been many conflicting stories told about the appearance and condition of the ice in Robeson's Channel. I have written to you here just as I saw it, and have given you my opinion about it, and I am confident, in my own mind, that had the 'Polaris' been pushed on at the time we were working up the east shore, a very high latitude might have been reached. After getting beset in the ice in Robeson's Channel we drifted slowly to the south-west down the channel against a south and south-west wind till the 3rd of September, when the ice opening by a north-east wind, we began to steam in towards the east shore of the channel. In steaming in, myself being at the mast-head, I saw a lane of open water about 2 or 3 miles in width, extending as far as I could see to the north up the east shore of Robeson's Channel; the ice had been driven off by this fresh breeze that was now blowing from the north-east, and had cleared the east shore of the channel of ice, and, I have no doubt, but what, at that time, we could have steamed up through Robeson's Channel without hitting a piece of ice; but we continued steaming in towards Polaris Bay, and at midnight, though it was pretty light at that time, we were in close to the shore with the vessel, and I accompanied Captain Hall on shore, who landed, unfurled the stars and stripes, and took possession of the land in the name of the President of the United States. The vessel was soon brought to an anchor, and the next morning the landing of stores, coal, and provisions commenced. Here our vessel lay till the 12th of August, 1872, a grounded iceberg forming our harbour. On the 21st of September the first musk-ox was captured; on the 10th of October following, Captain Hall started on his sledge journey to the north, returned on the 24th, and died on the 8th of November. The ice was broken up in our winter harbour on the 21st of November, and the ship driven against an iceberg. Two days after, the new ice getting sufficiently thick, we sawed the vessel out about 80 feet clear of the iceberg. On the 28th of November, during a heavy gale from the south-west, the pressure of the pack drove the iceberg in on to the vessel; a tongue of the iceberg running under the vessel, raised her up and lifted her over some. The next day, after the gale abated, it would have been an easy job to have sawed the 'Polaris' out clear of this iceberg again; had we done so, the 'Polaris' would have been sound the next spring, and the living aboard of her during the winter, would have been much pleasanter for all of us. I will not tire your patience any longer. There are some little items during this portion of the voyage up that I have omitted, which probably I ought to have put down, but I have given you a truthful outline sketch of it, as far as I am able to do. Hoping that this short narrative will prove satisfactory to your wish, I subscribe myself—Your most obedient and humble servant, H. C. CHESTER,

Late Chief Mate U. S. Steamer 'Polaris.'

IV.

From Mr. Morton.

NEW YORK, *March 12th.*

DEAR SIR,—In compliance with your request I will give you a statement of what I know respecting the voyage of the 'Polaris,' and my opinion, as you request it, in relation to the result.

I went with De Haven in search of Sir John Franklin, in 1850; again with Dr. Kane, in 1853, in which voyage we took the route through Smith's Sound, so that I had the benefit of previous Arctic experience in these two expeditions, and my opinion will be founded upon this previous experience and what I saw while on board the 'Polaris.' My position on board the 'Polaris' was that of Second Mate, and I suppose my opportunities for observation were as favourable as those of any of the officers or men. When the further course of the vessel was checked at 82° 16′ N. latitude, there was a heavy pack of ice in the mid-channel which obstructed her further progress, but to the east there was an opening between the pack and the shore, and a water sky ahead, in that direction to the north-east, indicating very plainly the existence of open water in that direction. There was no indication of land north or north-east. Those who supposed they saw it, saw, in my judgment, a fog bank, which, to inexperienced eyes, is frequently confounded with land. There was an opening also to the west of the pack, but no water sky there, and the land in that direction trended a little to the east of north. The pack which checked our course was setting south at the rate of a mile an hour at the very least, with a strong tide boiling up through any opening it found in the pack. We were nearer the east than the west shore, and Captain Hall, thinking he saw a harbour, went with a boat and landed on the east side, but after examining it twice and finding no harbour, he called a consultation of the officers, consisting of Captains Buddington, Tyson, Chester, Dr. Bessels and myself. Buddington was of opinion that it was impracticable to get further north, and was for returning south for a harbour at Newman's Bay. Tyson was for seeking "a harbour immediately." These were his very words. Chester was for pushing further north, under any circumstances, either to the east or the west. Dr. Bessels was for going to the west, and getting north as far as practicable, his opinion being that as there was open water here, we would find smooth ice and better travelling for sledges, and be nearer the north; and I coincided with Dr. Bessels, at least to the extent of getting farther north. I wished to hold on to what we had, if possible, as every inch was then important, and to take advantage of a harbour if we found one. Hall decided in favour of Dr. Bessels, and the attempt was made to get to the west, but in the effort we were inextricably caught in the pack and were carried by it so far south that we could not get into Newman's Bay. In my opinion, from the appearances at the north-east the vessel might have got farther north. I think if we had not been delayed when we were first obstructed by the pack we might have got to the northward by the east or the west shore some distance, of course one cannot say how far. I have known Dr. Kane to have surmounted greater difficulties than we then encountered. We lost nearly half a day before the attempt was made to get to the north and, in the meanwhile, were rapidly drifting south. Captain Tyson speaks of another consultation in which he recommended another attempt to get north, but I know of no such consultation; and I learn from Captain Buddington and Mr. Chester that no such consultation was held. I never heard of Captain Tyson recommending any attempt to get further north. At the consultation, and from all I have heard him say, he was always in favour of going into a winter harbour, although from the 1st to the 10th of September is the most favourable time for getting north, when there is open water; and there was open water during that time, and, in fact, more

or less during the winter, while we were in Polaris Bay. There is a very strong current setting to the southward through Robeson's Channel. The heavy masses of ice drifting down Robeson's Channel could not in my opinion get through Kennedy Channel, there being three islands abreast of Cape Constitution, and it is my opinion that a large portion of this ice passed out through Lady Franklin Bay to the westward. It does not get out through the South Fiord, eastwardly, as that is blocked up apparently by icebergs. Dr. Bessels and Mr. Bryan attempted to penetrate in that direction, but were unsuccessful. I think there is an under-current setting through that fiord from the eastward, but it is merely an impression. There was no sledge travelling during the winter or spring of any importance. Had Captain Hall lived, an earnest attempt would have been made with sledges to get further north, for we were well provided, having sixty dogs, two Esquimaux hunters and every facility for sledge travelling; but we passed the winter and the spring feeding the dogs upon pemmican, consuming a large amount of provisions without making any attempt with sledges. This branch was entirely under the separate control of Dr. Bessels. Why he did not make the attempt I do not know. Captain Buddington and the other officers, so far as I know, were willing to give him every facility. So far as any value is to be attached to my opinion from my previous Arctic experience I think the attempt should have been made. Dr. Bessels may have had good reasons for not making it, but I am not acquainted with them. After the snow melted and sledging was impossible, Captain Buddington fitted out boat parties, but they accomplished nothing. They lost three boats, advancing only 18 miles, and had to return overland on foot. While the boat parties were away, we sawed the vessel out from her winter quarters and got out into the open water of the channel with the intention of following up our boat parties to the north. We then made three attempts to get north, but were driven back by the pack-ice. We were short of fuel and had to work the ship under canvas, but she did not carry enough sail to make headway against a headwind and current. In addition to this, all the seamen, except Captain Buddington and myself, were away with the boats, and we had not force enough to make sail. She was a good sea boat, and as fine a one as I have ever been in. The only fault I could find was, that for Arctic exploration the construction of her bows, which were too upright, prevented her from lifting easily, when obstructed by ice, the pressure of ice against her wedging her in, and she did not lift easily over it as the Scotch whalers do. I wish to mention one important fact as contrasted with my previous experience—that is, the greater abundance of animal life as we got further north.

When I was with Dr. Kane, wintering in Rensselaer Harbour, we found no musk oxen, and during two winters only killed two deer. In the early spring we made three hunting expeditions from Polaris Bay and found a great deal of animal life, and musk oxen in abundance. On each occasion we went no farther than 12 miles east and killed twenty-six musk oxen. Had we desired, we could have killed a great number, and laid up beef enough to last for a season. In addition, there were large quantities of brent geese, eider duck, ptarmigan, doveking, besides hares and plenty of seals. The fowl were flying in the spring to the north, whence they return to the south in the autumn. The eider duck and the brent geese hatched their young on islands to escape from the foxes, which destroy their eggs and young, from which I infer, as we saw large quantities of these birds going north every spring, that there must be islands further north, and open water. I know that these birds raise their young on islands, because I have constantly observed it during my former expeditions with De Haven and Kane. We also saw in our journeys into the interior, high grass in the valleys, where the musk oxen feed, in lat. nearly 82°, and I suppose beyond it.* In answer to one of your inquiries, my impression is, from what I saw, that Greenland does not extend to the Pole, but is surrounded at the north by water, but this is only an opinion founded upon the trend of the land to the eastward. I have made three Arctic voyages in this direction, and as I am now fifty-seven years old, I shall not probably make another. If I were to express the result of my experience, it is a firm conviction that the Pole can be reached by this route. I know of no difficulties that would make it impossible. I think it can be accomplished by two vessels properly equipped and manned, and conducted by a competent and resolute leader. Captain Hall was a determined and persevering commander, and had he lived he would, in my opinion, have got much further north, if indeed he would not have reached the Pole itself. The result of my third voyage is that I am more than ever convinced of the practicability and possibility of reaching the Pole, and I firmly believe it will yet be done.—Respectfully and truly yours, WILLIAM MORTON.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

AT the monthly meeting on the 22nd of April, the Vice-President stated that Baron Osten Sacken had resigned the presidency of the section of physical geography, on account of illness, and that M. Rekhnevsky had been elected to fill the vacancy. M. Veniukof, the Secretary, had also tendered his resignation, and M. Wilson had, on the motion of the Vice-President, been elected to succeed him.

M. Wilson then read a programme of the operations of the forthcoming expedition up the Amu-Daria. The course of events of late years had turned general attention to the eastern empire of Russia, and the gradual introduction of Russian civilization there had afforded a good basis for scientific exploration. Among other tracts, the eastern portion of the Tian-Shan, the Pamir plateau and the lower Amu had attracted the special notice of the Society. As the exploration of these regions depended in a great measure on political considerations, the Governor-General of Turkistan was asked to say which of the three schemes it might be most feasible to set on foot first. But previous to the receipt of any reply from his Excellency General Kauffmann, the Society had had the subject of an expedition to the Lower Amu under consideration, in consequence of the receipt of a memorial from Colonel Glukhofsky, who urged the desirability of completing the scientific labours executed during the Khivan campaign, and in consequence a committee, appointed by the sections of mathematical and physical geography, was drawing up a plan of operations, of which the examination of the present as well as of the ancient beds of the Oxus formed a special feature. General Kauffmann was accordingly asked to tender his advice on this scheme, and, his opinion being favourable, the sanction of the Emperor was eventually procured through the Minister of War, the imperial decree giving its permission for the expedition to start during the current year, but stipulating that all exploration should be confined to the Russian possessions on the right bank of the Oxus.

The plan of the different operations was drawn up by the committees of each section, and the whole examined

* Around Polaris Bay there was an abundance of flowers of various kinds and of all colours. The willow grew to a large size; sorrel and grasses were plentiful. The willows farther south are dwarfed, seldom rising more than two or three inches above the ground, while around Polaris Bay they were three feet high, and formed large bushes. I took no observations, but it is my impression that the temperature was milder in Polaris Bay than it was in Rensselaer Harbour, farther south, during the two winters that I passed there.

by the Council of the Society. The expedition is to be composed of four sections, viz. :—

Firstly.—The geodetical and topographical section, composed of two officers and four surveyors, under the command of Staff-Colonel Stoletof, will execute a careful survey of the delta of the Oxus, and of one or two other tracts of interest, such as the Sheik Jeli range to the east of the river. They will also carry a series of levels from the mouth of the Oxus to the delta; and a third from the Oxus to the Jaxartes. Captain Zoubof, in command of a steamer belonging to the Aral flotilla, will co-operate with this section by surveying the sea face of the delta, by taking numerous lines of soundings, and executing other hydrographical labours.

Secondly.—The meteorological and hydrographic section is entrusted with the duty of studying the climate, the river system and the navigableness of the streams. To this end two stations are to be erected, at one of which hourly meteorological and magnetic observations will be made as well as observations on the depth and swiftness of the Oxus, and on the nature of its bed. At the other station similar observations will be made, but not so frequently. The first will be probably situated at some place like Nukus, where the mass of water flows past concentrated in one deep bed, and the second just below the last of the *aryks* or canals, so as to admit of some estimate being formed of the amount of water carried off for irrigation purposes. The superintendence of this section will be entrusted to M. Dorant, of the Central Observatory, who will be assisted by a deputy, M. Malberg, and several scientific officers from Turkistan.

Thirdly.—The ethnological and statistical section will be commissioned to collect information on the ethnology, the number, and tribes of the sedentary and nomad peoples inhabiting these regions, as well as to describe their manners and customs, their dwellings, dress, currency, manuscripts and traditions, to identify various places mentioned by Eastern writers, and to examine ruins. The duties are entrusted to Colonels Stolelof, and Sobolof, M. Sartlarof, intrepreter, and M. Karazine, a painter.

Fourthly.—The physical section will have to study the geological formation of the Oxus delta, and the various changes it may have undergone, the structure of the basin, and to examine the coast line of the Aral to the eastward (so as to determine the question of its receding by gradual evaporation), as well as the old river beds, which are still visible between the Oxus and Syr Daria, and, lastly, to acquire complete information on the subject of the fauna and flora of the Aralo-Caspian basin. These labours will be accomplished by Messrs. Sivertsof and Barbot de Marny, and M. Simonof, a botanist.

While the detailed plans, which had been separately and minutely laid, were under the general consideration of the Council of the Society, information was received that the Society of Naturalists of St. Petersburg was also organising an expedition of its own to the Sea of Aral. Inquiry being instituted, it appeared that this scientific body were desirous of making a study of the invertebrate fauna of the Aral and Caspian Seas, and of exploring the geology and zoology of the Ust-Urt plateau, the north part of the Chink, and the lower Oxus, as far as the Sheik-Jeli range, so as to arrive at some definite conclusion on the possible former union of the Aral and Caspian Seas. But this expedition would not probably start till late in the autumn. The two societies, it thus appeared, would not clash in their labours—one working to the east and the other to the south-west of the Sea of Aral—except, perhaps, in the neighbourhood of the Sheik-Jeli hills; it seemed thus desirable that this latter part of the operations, as well as the geological exploration of the Oxus delta, should be done by the same person, and M. Barbot de Marny, with the consent of both societies, undertook the task.

Many foreigners had manifested a desire to join the Oxus expedition, and the Russian Government had permitted Major Herbert Wood, of the Royal (late Madras) Engineers, to take part in it.

Although a little disappointment might be felt that the expedition was not to be on the scale at first proposed, the results, it might be confidently anticipated, would prove of the very highest value in greatly enlarging our knowledge of Central Asia.

The proposals of Colonel Glukshofsky, referred to above, for the carrying out of some scientific works in the region between the Aral and Caspian, had been laid before a Committee of the mathematical and physical sections, who reported that the proposals embraced projects for the carrying of a series of levels from the Caspian to the Aral, so as to determine precisely their respective altitudes, for the carrying of another series along the entire length of the dry bed of the Oxus, and for exploring that tract between the Lower Oxus and the Bay of Krasnovodsk, where the remains of dried up canals are so frequent. The committee reported that there was every prospect of the first project being carried out, as, during the ensuing summer—from April to September—two detachments of the Orenburg division would be encamped on the Ust-Urt, and the levels could thus be carried by the shortest route, which is only about 350 versts long. The expense was estimated at about 10,000 roubles, and through the intervention of His Imperial Highness, an Imperial Decree has been obtained granting the sum named. The work will be carried on under the direction of Colonel Thillo of the Orenburg section. With reference to the second project, which has an important bearing on the eventual opening of a trade-route between Europe and Central Asia, the Society is still in correspondence with the Government of the Caucasus, and with M. Middendorf, who has been requested to take in hand the natural history branch of whatever scheme is determined on. The probable expense is not yet known, but Colonel Glukhofsky has generously contributed a sum of 3000 roubles.

Colonel Glukhofsky is organising a caravan in Moscow, which is to travel as far as Cabul, by way of Astrabad and Herat and return by the Bamian Pass, Balkh, Bokhara, Khiva, and Krasnovodsk, and he has suggested to the Society the desirability of attaching an observer to the party. M. Ogorodnikof has been accordingly selected for this duty, and he will lay down a route survey, take height observations, and collect all the information he can on the road, a sum of 300 roubles being placed at his disposal to defray incidental expenses.

M. Minaief has also left St. Petersburg on a more distant mission; his object being the study of the languages, ethnology, and primitive Buddhist religion of Burmah and Ceylon. He also proposes to devote attention to the mountainous races of Nepaul and Afghanistan, and to make a careful comparison between the Buddhist *Stupas* and the Kurgans so common in Russia. The Society is unfortunately unable to afford pecuniary assistance to M. Minaief, but it has provided him with letters to the Indian authorities, and has begged the Governor-General of Turkistan to assist his researches by all the means in his power.

M. WILSON concluded his report by mentioning the titles of some new publications of the Society.

A vote of thanks was then passed, on the motion of the Vice-President, to Colonel Glukhofsky for his active interest and co-operation in the schemes indicated above, and the meeting adjourned after M. Rittich had given an interesting account of his progress in compiling an ethnographic map of Russia, a task which is approaching completion, and which will form a standard work of reference for future students.

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FRENCH GEOGRAPHICAL SOCIETY.

Meeting of April the 10th, 1874.

ADMIRAL DE DOMPIERE D'HORNOY, Minister of the French Navy, announced that M. Delaporte and his companions had been recalled to France in consequence of severe illness, therefore the mission to the Cambodje was postponed. The Admiral urged that the sums granted by the Society should be reserved for a future mission.

M. DUVEYRIER read a letter he had received from Dr. Schweinfurth, dated El-Kharghé, in the Great Oasis, 12th March 1874. The doctor states that he had not observed any kind of carving or sculpture on the rocks of the countries of the western tributaries of the Upper Nile, nor had he found any traces of the Dinka, the Bongo, the Mittou, the Kredj, and the Monbuttu having ever lived there in a condition different from that which they now present.

Dr. HAMY, referring to this part of Dr. Schweinfurth's letter, reminded the meeting that on a former occasion he had stated that the Bongo resembled more the Soaqwa, or Bosjesmen, than the Akka. Having lately examined the types collected by Froberville in the Makwa country, he had discovered in them evidence of the transition between the Soaqwa and the Bongo.

M. MAUNOIR read a letter received from M. CHARLES GRAD, in which he states that the Committee of Polar Exploration in Bremen had named a cape in Greenland after the French voyager Blosseville. A letter was also read from M. TISSOT, French Minister at Tangier, containing a review of the present political condition of Morocco. M. Tissot announces that his narrative and map of a journey from Tangier to Fâs and Rabat are now ready. He has discovered the traces of the entire Roman road. He also announces his intended journey towards Zerhoun, and adverted to an error that had crept into the report of a preceding meeting; namely, that the Latin inscriptions he had discovered are at Qaçar Fara'ûn, anciently called Volubilis, and not at Mulaï Idrîs, which is identical with Oualîli.

General Meeting, April 25th, 1874.

PRESIDENT'S ADDRESS.

THE President, Vice-Admiral Baron DE LA RONCIÈRE LE NOURY, opened the session by an address before a crowded audience. He first alluded to the unceasing work of death, which a few months before had imposed on him the painful duty of paying a tribute to the memory of a departed friend—the late President, Marquis de Chasseloup Laubat—and which now again compelled him to open his address with words of mourning and regret. The year 1873 had seen two men disappear who had devoted their whole lives to the progress of geography, and whose works had furnished Europe with a vast amount of valuable information. These two men were David Livingstone and Francis Garnier. The President dwelt more particularly upon the funeral ceremony of the great explorer, Livingstone, which he had attended as the representative of the French Geographical Society, not alone to express the condolence of the Society, but to show that it was not England only who had to mourn the loss of such a man, and to prove also the confraternity which should exist between those associations, which, setting aside the sterile struggles of politics, had borne themselves above international jealousies, and united their efforts for the advancement of science, and consequently for the welfare of mankind. He was deeply impressed by the great number of people who filled the vast nave of Westminster Abbey, revealing as it did the profound interest excited by the labours of Livingstone, and clearly showing that the English nation, proud of its traditions and jealous of its fame, knew how to honour those men who added so much to their country's greatness. The President was deeply impressed not only by the solemnities of the funeral, but by the homage paid by the English to that science which has inspired so many sacrifices, furnished so many victims, and given expression to those true but cruel words—"The death of the traveller is geography's glory."

Amid these affecting scenes Admiral de la Roncière's thoughts wandered irresistibly to the unfortunate Garnier. He gave a sketch of his character, and showed how, full of that perhaps thoughtless ardour which inspires great undertakings, he could not refrain from imprudences which in all his travels had been crowned with success, but which alas! at last proved fatal to him. The President reviewed Garnier's life from his birth at St. Etienne, in the year 1839, and followed him to the school at Montpellier, and to the naval school. His first voyages found him in the Brazilian waters and across the Straits of Magellan into the Pacific. On his return to France he was sent to China. After a campaign under Admiral Charner, to whose staff he was attached, Garnier again returned to France, where he attended the School of Artillery practice at Vincennes, and simultaneously associated himself with several scientific works. He was then called back again to the far East. He halted at Cochin China. The French establishment there was thoroughly reorganised, and the French authority strengthened under the superior direction of the Marquis de Chasseloup Laubat, owing as much to the force of arms as to the wise measures of that eminent minister. Garnier, at that time but twenty-three years of age, was appointed to the post of inspector of the affairs of the natives, and entrusted with the administration of the most important town of the French colony, Sholen, near Saïgon. Here he gave full vent to his adventurous and fecund imagination. His sagacity demonstrated to him that the development of French influence should not be limited to the territory of the newly acquired colony. There are to the north unknown countries which must be explored, and the large rivers flowing out of those countries to the south must become the arteries of a future commerce. Garnier's object was to penetrate through Laos into Tibet, the natural road thither being the Mekhong. The minister accepted the persevering suggestions of the young officer, and decided that a mission should be sent; but its initiator, not being old enough to have command, was placed under the orders of Captain Dondartde Lagrée.

The PRESIDENT said that it was not the proper time to revert to the events of that long journey, during which the chief of the mission perished, leaving the command to his second. Garnier took upon himself the difficult task of conveying the body of his commander for the rest of the journey, and finally buried it at Saïgon on French soil. Numerous publications have related the fatigues and shown the results of the labours achieved by that mission, and the excellent narrative of the journey contains an account of the enterprises and successes, of the hopes and fears of the explorers, on their journey of nearly 10,000 kilometres, two-thirds of the distance having been traversed in boats and one-third on foot.

The reward of that grand enterprise was the Gold Medal of the French Geographical Society, and Garnier's admission as a member. At the same time the Gold Medal of the Royal Geographical Society of England was awarded to him, and the Asiatic Society of England elected him a Fellow, their number being limited to a hundred. Lastly, in 1871, the International Congress at Antwerp granted to him, as well as to Livingstone, a medal of honour.

During the Franco-Prussian war, being shut up inside Paris, he was attached to the 8th sector, where his conduct attracted notice. After the capitulation of

Paris he returned to his favourite studies, and with the aid of one of his companions, M. Delaporte, formerly his pupil, and who may, perhaps, be his successor, published his work. The book obtained for its authors medals of honour at the Vienna Exhibition.

In view of completing his researches, he again started for Cochin China. The Mekhong River, however, did not permit of communication with Tibet, through Laos, consequently he had to search for another road. But political circumstances compelled him to give up all hope of starting an expedition in the empire of Annam. Unfit for a life of inactivity, he went to China, and undertook to explore, at his own expense, the upper course of the Yang-tze-kiang, a river which he ascended to its waterfalls. On his return he was called to Saïgon by Admiral Dupré, governor of Cochin China, and commissioned to Tong-king, a country that was to be again rendered a dependency of the court of Hué. Garnier looked upon the mission as a new field for discovery. He made himself master of Hanoi, the capital of that rich country, and succeeded in re-establishing order. Some rebels, however, still remained unruly, but were vigorously attacked by Garnier. In that obscure scuffle he met his death, in the midst of a most exemplary and brilliant career, and which promised so much for his country.

The PRESIDENT regretted that he was compelled to abridge the details of such a valuable life for want of time. Briefly referring to the death of M. de Billy, General Inspector of Mines, he concluded his address with an account of the proceedings of the project of the international congress which is to be held in Paris in 1875.

M. MALTE BRUN delivered the report of the Commission for the rewards, concluding with the grant of a Gold Medal to Mr. Alphonsus Pinart, for his travels and observations on the north-western coast of America.

M. H. DUVEYRIER then read a paper on the life and labours of Dr. Livingstone.

M. A. LE MERCIER read a notice on the foundation of the French Alpine Club, and Abbé BOUCHE, formerly a missionary at Dahômé, read a paper on the Slave Coast of the Gulf of Guinea.

Meeting of May the 8th, 1874.

M. DUVEYRIER read a letter he had received from M. N. Dournaux Dupéré. On the 27th of March, he was about to leave Ghadâmès, in company with two Ifôghas Touâreg, and to follow the road of Rhât, in the neighbourhood of which oasis he hoped to meet with Ikhenoûkhen, the most powerful chief of the Azjer confederation in order to settle with him for the continuation of his journey. The letter gave valuable information concerning the present political state of the Sahara. M. Duveyrier took that opportunity of refuting some disheartening rumours which had found their way into the newspapers, according to which M. Dournaux Dupéré had fallen a victim to the barbarity of the Touâreg in the vicinity of Rhât, about the 20th of April. These hearsay tidings reached Algiers on the 6th of May. As the traveller had started from Ghadâmès on the 27th of March, he could not reach Rhât in less than twenty-four days with a caravan. Had he been killed on his arrival, and the tidings of the event sent directly to Algiers, it could not have been known there before the 14th of May; the news therefore was not worthy of belief.

Abbé DURAND read a letter he had received from FATHER DUPARQUET, who announced his arrival at Punta Negra, the scenery of which place is very beautiful, and the climate most salubrious. Eight kilometers from Punta Negra, the river Luiza Loango issues from a lake. The missionary enumerates the factories established there, one of them, Massabé, being at the mouth of the river. The French missionaries have chosen Landana for their station, which lies in the middle of a rugged country.

The President of the Council, M. DELESSE, informed the meeting that the President of the Republic had given Admiral de la Roncière to understand that steps would be taken towards securing future support for the widow and child of Francis Garnier.

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VIENNA GEOGRAPHICAL SOCIETY.

AT a meeting of the above Society on the 28th of April, Professor Von Hochstetter being in the chair, Colonel Goodenough, military attaché at Vienna, who on several occasions had afforded valuable assistance to the Society, and through whose instrumentality an important collection of works on British India had just been presented, was elected as corresponding member.

News from Brisbane was read, by which light is thrown on the mysterious end of the German traveller, Ludwig Leichhardt, of whose fate and disappearance in Central Australia in the year 1848 nothing had hitherto been known. In February last, Andrew Hume, who in 1872 had been sent out by the Sydney Government to search for traces of Leichhardt, returned to Brisbane with the news that he had discovered Classen, Leichhardt's fellow traveller, living amongst a tribe of bushmen at the head waters of Stavart's Creek. Classen had grown very weak and aged, but refused to leave his associates. He nevertheless furnished Hume with all particulars of Leichhardt's end. According to his story, he (Classen) had separated from the main body of the expedition and was ranging about in quest of water, when a mutiny broke out among Leichhardt's followers, who finally deserted their master and set off in a north-westerly direction. When Classen returned he found Leichhardt bereft of all supplies, the mutineers having stripped him of tents, horses, and the whole of his equipment, and left him to die, a fate to which Leichhardt succumbed five days later. According to Classen's present companions, the mutineers were eventually slain by natives whom they fell in with, in their attempt to reach the more populated districts of South Australia.

Hume brought home Leichhardt's quadrants, his watch, and about seventy-five pages of his notes; nevertheless, Hume's account has found many unbelievers, but it may be fairly presumed that a satisfactory conclusion respecting its veracity will soon be arrived at, as the objects found have been forwarded by him to the Government authorities at Sydney.

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